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"Telephony's" Annual Review of Industry

Better Service and Sale of More Service Facilities for Increasing Revenues Without Increased Operating Costs Outstanding Features of Year—Developments in Telephone Field and Allied Branches—Survey Shows Trends of Events

By Stanley R. Edwards,
Editor of TELEPHONY

Improvement of service, through adoption of better methods and installation of modern equipment, and the encouragement of greater use of telephone service and facilities marked the year 1928 in the telephone industry.

Of course, there were many other developments, but outstanding were the efforts to improve service and expand its scope, thus utilizing spare facilities and increasing revenues through the sale of additional services. All the Bell companies concentrated upon service improvement and the sale of additional service facilities. The result of this activity during the year has been a substantial increase in the revenues and in the number of telephones in use.

As the year closes the total telephones in the United States number approximately 19,380,000, of which about 3,500,000 are dial telephones. All but a very small percentage of this number have long distance connections with every part of the country. The number of Independent telephones not connecting with the Bell long distance lines is probably in the neighborhood of 160,000.

The scope of the long distance connections with Mexico, Canada, and with Europe over the transatlantic circuits bring the number of interconnected telephones in the world to almost 27,000,000 out of a total of approximately 31,500,000.

The range of the transatlantic service was gradually extended so that at the end of the year it was possible to talk from any part of the United States and Cuba and from many of the larger centers of Canada and Mexico to any point in Great Britain, practically all of France, and to the larger cities in 12 other European countries and one city in Africa. Thus three continents were brought into communication with one another; the 27,000,000 telephones which may be thus interconnected, serve a population of nearly 330,000,000.

In the extending of the transatlantic service to the different countries men prominent in public life participated in the formal openings. The formal opening of the service between America and Madrid, Spain, made a deep impression as showing the wonderful possibilities of the telephone in drawing the people of the world closer together.

President Coolidge in speaking from Washington directly to King Alfonso VIII of Spain in Madrid on that occasion well expressed this when he said: "I believe it to be true that when two men can talk together, the danger of any serious disagreement is immeasurably lessened and that what is true of individuals is true of nations. The international telephone, therefore, which carries the warmth and the friendliness of the human voice will always correct what might be misinterpreted in the written word."

This was the first time that the chief executives of an American and a European nation had talked across the Atlantic. It presages much for the future in breaking down the barriers of misunderstanding due to the intervention of great distances.

Purchases and Mergers.

The so-called buying movement in the Independent field continued during the year. During the latter part of the year this activity somewhat abated due undoubtedly to the fact that the ownerships of plants which have not been sold are vested in men who have no desire to relinquish control of their property.

Many of the new companies in the field resulting from the consolidation of other companies have perfected operating organizations and are engaged in improving and modernizing the plants which they have acquired. Others of these companies apparently have made little effort to estab-

lish a real operating organization, allowing the old management to carry on in the local exchanges with little or no financial aid. These companies also have held up improvements to their plants and service has either been at a standstill or retrograded.

Plants which were in fairly good condition can continue to operate for some time with very little expenditures for maintenance and depreciation. However, as in everything else, a day of settlement is bound to come.

As many of these consolidated companies are of such size as to come under authority of the Interstate Commerce Commission, their annual reports to that body will indicate their financial status. The figures showing results of a complete year of operation will be available for statistical purposes during the coming year. They will indicate which of the new organizations are endeavoring to operate and maintain their properties according to methods developed through years of experience.

During the latter part of 1928 a new form of consolidating organization became prominent. It is a holding company which includes not only telephone properties but water, electric light, power, gas and ice, or other utility service property. Just what the result of the operation of such a combination will be it is impossible to forecast at present.

One result of the purchasing and consolidation of properties has been the elimination of owners who were not interested in the development of their properties, carrying it on as a side line. In a number of cases greatly improved service has also resulted.

There have also been many changes and shifts in the operating personnel. These shifts have brought a considerable demand for competent and experienced telephone men, for executive positions, and they have also resulted in the elimination from the field of some incompetent persons.

Independent-Bell Relations

The relations between the Independent and the Bell groups of the industry continued throughout 1928 on the whole harmoniously.

Several conferences were held between representatives of these groups at which the principal topic of discussion was the matter of the Bell obtaining minority interests in Independent properties.

COMING CONVENTIONS.

South Dakota Telephone Association, Sioux Falls, Cataract Hotel, January 15, 16 and 17.

Arkansas Telephone Association, Little Rock, Marion Hotel, January 21 and 22.

Minnesota Telephone Association, St. Paul, Hotel Lowry, January 22, 23 and 24.

Nebraska Telephone Association, Lincoln, Hotel Lincoln, February 13, 14 and 15.

Wisconsin State Telephone Association, Madison, Loraine Hotel, February 20 and 21.

Texas Independent Telephone Association, Ft. Worth, Texas Hotel, March 25, 26, 27 and 28.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 16, 17 and 18.

Indiana Telephone Association, Indianapolis, Claypool Hotel, May 7, 8 and 9.

Up-State Telephone Association of New York, Seneca Hotel, Rochester, May 22, 23 and 24.

The Independent group maintained a position that purchases of minority interests in Independent properties by Bell companies, or expansion of existing minority interests are detrimental to the future development and preservation of the Independent group. While the representatives of the Bell group have not agreed to this viewpoint, it is the understanding that the general Bell policy is in sympathy with the stand of the Independent group.

In the operating field the relations between the Independent and Bell companies were generally harmonious. A spirit of cooperation between the companies for the improving of service and development of business was quite generally in evidence.

Work of Regulatory Bodies.

Apparently there has been a decrease in formal cases passed upon by the various state regulatory commissions. In some states there has been a complete change in the character of the cases. Where formerly the cases related to service complaints and rate increases, applications for authority to sell or to purchase formed the bulk of the cases during the year.

While only in a few states the commissions pass upon securities, the commissions generally have scrutinized applications for purchase and the issuance of securities with particular care. In Wisconsin and Indiana the commissions have been particularly vigilant in opposing any activities which savored of speculation in telephone properties.

In applications for rate increases, especially in cases of the smaller companies, higher schedules have been authorized in most instances. In several states, companies applying for increased rates have accompanied their applications with statements signed by 60 to 80 per cent of their subscribers agreeing to higher rates upon installation of improved service.

In two different states the commissions have authorized establishment of a competing exchange. The Minnesota commission authorized a competing exchange at Bagley, but it was never installed, for the companies involved reached an agreement whereby the existing company sold its property to the invading company to which the commission had given permission to establish a second exchange.

The Indiana commission likewise authorized the establishment of the competing exchange at Versailles but an appeal has been taken from its ruling.

In both these instances the commissions had authorized the existing companies to increase their rate schedules and in the orders permitting the competing companies to enter the field approved lower schedules. Undoubtedly in both cases the public relations of the existing companies were bad, but it would appear that the commissions should have exhausted every resource to avoid a situation which would result in duplication of service, or loss to the owners of the existing exchanges.

The Bell companies on the whole were not involved in any new rate cases of importance. The larger cases pending before courts and commissions were cases commenced in previous years, and involved nothing new.

The case of the New York Telephone Co., which dates back to 1924, is still before the master in chancery and will possibly be passed upon during the first part of 1929.

The state-wide investigation of the Ohio Bell Telephone Co., which was commenced in 1927, continued throughout the year and in November hearings were indefinitely postponed. Whether or not the case will be continued by the new commission

which will be appointed by the governor the first of the year is doubtful.

Evidence was taken during the year on the application of the Pacific Telephone & Telegraph Co. for increased rates in San Francisco and the Bay district. As the year closed, the commission announced its determination of the valuation of the company's properties involved in the application.

The suit before the state supreme court looking to the ouster of the Michigan Bell Telephone Co. from the state of Michigan, continued in court without a decision being handed down.

A case which received considerable publicity was that of a dispute regarding commissions on tolls in which the Oklahoma-Arkansas Telephone Co. of Poteau, Okla., and the Southwestern Bell Telephone Co. were involved. The Oklahoma commission in a final decision approved the basis of settlement which the Southwestern Bell company has used for a number of years. The Oklahoma-Arkansas company appealed from this order to the state supreme court, but no decision has been handed down.

Federal Depreciation Order.

The early part of the year the Interstate Commerce Commission suspended indefinitely the operation of its order on depreciation. This was done on behest of the railroads in order that additional testimony might be presented. At hearings held the telephone companies also presented additional testimony, made their oral arguments and filed briefs.

The entire matter is now in the hands of the Interstate Commerce Commission and the industry awaits its decision.

Construction.

In 1928 the Bell system spent approximately $430,000,000 for new construction and improvements of its property. This was some $55,000,000 more than in 1927. The indications are that in 1929 expenditures for construction purposes will be even greater than in 1928.

When one pauses for a little figuring it is found that practically $800 a minute was spent for the improving and expansion of telephone service during 1928.

Manufacturers and Sales Field

As the year closes, indications are that 1928 was an excellent year for the telephone manufacturers and telephone supply firms. After the first part of the year it became evident that the improvement and modernization of many plants could not be longer delayed and accordingly the owners placed orders or made plans for the work.

Many of the new companies resulting from consolidation of properties, as previously stated, developed their operating organizations and these became active in improving the properties and doing necessary construction work. Many of the plans for improvements will be carried out during the ensuing year.

An interesting development in the telephone manufacturing and sales field of the industry during 1928 was the so-called "separation" of the Graybar Electric Co. from the Bell organization.

This was brought about by the sale of the $3,000,000 Graybar common stock to its officers and employes, announcement of which was made in November. The Western Electric Co., of which the Graybar was the sales supply subsidiary, retains $6,000,000 preferred stock which will be retired in the future.

Inasmuch as the Western Electric Co., which is the manufacturing and supply purchasing agent of the American Telephone & Telegraph Co., is also owned by the latter company, there is significance to the statement that no officer or employe of the A. T. & T. is to own any stock in the Graybar reorganization. The parent Bell company owns 98 per cent of the Western Electric Co., which owned the Graybar until the recent sale to the employes and still retains $6,000,000 of Graybar preferred stock.

These "wheels within wheels" have caused considerable speculation in the telephone field. One theory held is that the Bell organization found the Graybar concern, for various reasons, rather uncomfortable to hold, and thought it desirable to ease it out the back door of the family mansion through the medium of employe ownership.

From the officials of the Graybar comes this explanation: "The fact is the initiative (to change the ownership) came from within and was coincident with the parent company's decision to confine its activities strictly to the telephone field."

The logical sequel of such a decision might also mean that the A. T. & T. would sell its 98 per cent stock holdings in the Western Electric Co., but it is said the latter has not given the Bell organization so much trouble as has the Graybar company. It is not believed, therefore, that the "separation" policy will cause the parent company to dispose of the Western Electric Co.—at least, voluntarily.

Telephone Conventions.

Telephone conventions and district meetings held during the year were without exception more largely attended and greater interest was taken in the proceedings than in any previous year.

The programs of the various state conventions varied in character, but all were designed for the presentation and discussion of subjects that were of particular interest to the telephone people of the respective states. While the state conventions discussed the general problems, the district meetings were more personal in character and took up the individual problems of the attending companies.

The programs showed a distinct trend toward the discussion of practical operating matters.

The increased attendance at these meetings was largely due to the presence of more of the rank and file of the operating organizations, and it also marked the advent of the younger men in the operating field, who are assuming greater responsibilities and preparing to handle them efficiently.

The Telephone Personnel.

The telephone systems of the United States are manned by practically 400,000 men and women. Although the telephone employes have always been noted for their enthusiasm for their work and their business, this is true probably to a greater extent than ever before.

The average telephone man or woman, be he owner or employe, is more contented with his line of work than ever before; and positions with telephone companies are viewed by the general public as desirable ones to have.

There are a number of reasons for this outside of the fact that the work itself is most fascinating, and that once a person enters telephone work, it is seldom that they are happy in any other industry should they leave the field. Probably one of the influential factors in the great interest which the employes take is the great number of them who are stockholders either in the Bell companies or in the Independent companies.

Another influence has been the education concerning their business which employes have had as a result of campaigns

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for new subscribers and for the sale of additional telephone facilities. In taking part in these new revenue-producing campaigns, employes have learned a great deal about the telephone's use and the operation of the various departments of their company.

They have taken great pride in "personalizing the business," for each employe has considered himself the personal representative of the company with the responsibility devolving upon him of making the best possible impression for the company upon the subscriber or telephone user. Practically every employe in the telephone industry during the year became greatly interested in actively personalizing the business.

The telephone industry is a constantly expanding one and changes are continually taking place. Due to these influences, persons of ability in many diversified lines are required. It is a business in which experience counts; hence, employes who are ambitious find it a field in which they can advance without competition for the higher positions from outsiders.

In the Independent field since the buying wave started, many telephone people felt uncertain as to their prospects. The past year has brought about a change in this situation. The newcomers found that they must have competent, experienced telephone people to operate their properties for them. As a result of this, many experienced men have found opportunities for advancement as executives in the new operating organizations.

Most ambitious persons consider the opportunities for advancement in the telephone field as greater now than in previous years. This, with the many other advantages found in telephone work, have made for an excellent morale.

Decentralization of Bell Companies.

While in the Independent field there has been merging and consolidating of exchanges with accompanying centralization of authority, several of the Bell companies have undergone a process of decentralization for more efficient operation.

The Ohio Bell company has split its territory into two sections with an operating department for each area. The Illinois Bell Telephone Co. divided into two sections, the state area and the Chicago area. The Northwestern Bell Telephone Co., which operates in five states, divided into four areas for better operating purposes. The Pacific company already had separated into several operating divisions.

This decentralization is another move toward bringing the companies into closer contact with the people served, through closer supervision of the service and facilities by department heads with ample authority to make necessary decisions.

Most of the Bell companies have changed their method of billing to what is known as rotation billing. Instead of sending out all the bills on the first of the month, the dates have been changed to different parts of the month so that bills are being sent out continuously throughout the month. This system has many advantages to the companies, the main one of which makes for uniformity of the work in the offices instead of concentrating it in a few days.

Payments to Parent Bell Company.

Early in the year a change was made in the contract of the parent Bell company with its license or associated companies. The contract which provided for 4 per cent of the gross revenues was changed to reduce this charge to 2 per cent. The various Bell companies, however, purchased the transmitters and receivers which were formerly owned by the American Telephone & Telegraph Co., and supplied and maintained as part of the contract obligations.

The contract payments for the various services furnished by the A. T. & T. Co. to its associated companies has been for years a bone of contention before the regulatory bodies. The contract originally specified the payment of 4½ per cent of the gross revenues of the associated companies to the parent company. This was reduced two years ago to 4 per cent and for the past year has been 2 per cent.

It has always been admitted that the various services supplied the associated companies by the A. T. & T. Co. are most valuable, but the basis upon which settlement was made was frequently challenged in rate cases before the state commissions. With the reduction of the charge to 2 per cent, undoubtedly there will be less contention over these payments.

Revenue-Producing Campaigns.

For years telephone companies have been content to operate without active and aggressive solicitation of business. The underlying reason for this lack of salesmanship in the telephone field was due largely to the great growth of the industry. The demand for telephone service was in most cases greater than facilities could be provided or extensions financed.

In the past few years the financing of improvements and the manufacturing of equipment has caught up with the demand for service. For the first time in the history of the industry it may be said that there is adequate plant and faciilties to more than care for the existing demand for service. In order to increase revenues from the utilization of idle equipment and from supplementary services requiring little if any additional operating expenditures, telephone companies inaugurated aggressive sales campaigns.

The Bell companies established departments for the development of new business, and interested all employes in talking telephone service to everyone with whom they come in contact. Its campaign is a continuous one. In the last months of the year many new subscribers were added and in other cases additional service was sold, such as extension sets and changes from one type of service to another.

Many of the Independent companies put on campaigns for new business, organizing employes into divisions and offering prizes for the best results. These campaigns as a rule extended over brief periods of the year.

Subscriber's Equipment and Use.

The use of the telephone under modern conditions necessitates a continually increasing amount of telephone station equipment at the subscriber's premises. This trend continued during 1928. It is illustrated not only by the tendency to substitute a line with one or more extensions for a single telephone, but by increasing use of private branch exchange equipment, making possible the interconnection of a number of telephones on the subscriber's premises as well as the connection of any of these with outside telephones.

The use of this equipment has shown remarkable growth in the last 20 years and there are now in the Bell system alone more than 125,000 private branch exchanges through which are connected about 2,700,000 telephones. The boards vary in size from a small type connecting a few telephones to boards with positions for a number of operators serving 3,000 or 4,000 telephones. It is estimated that during 1928 private branch exchange

equipment with positions for over 15,000 operators was placed in service.

During the year an additional type of dial system private branch exchange switchboard was standardized in the Bell system. By the use of this board, business houses which require fewer than 100 lines can be provided with dial private branch exchange service on an economical basis.

At the end of 1927 there were approximately 2,900,000 dial telephones in the country, or about 16 per cent of the total telephones. At the end of 1928 there were approximately 3,500,000 dial telephones in the country, or about 18 per cent of the total telephones, installation of this type of equipment having been made by the Bell companies in exchange areas where conditions made it preferable to the manual type of operation.

The year was characterized by further growth in the volume of telephone traffic which averaged 76,000,000 completed conversations daily. Of these, more than 3,000,000 a day were toll conversations.

Making Telephone More Useful.

The Bell companies throughout the country were active during the past year in the development of methods for making the telephone service of even greater value to users.

Helpful cooperation was extended to business men in aiding their efforts to lower distribution costs through intelligent and intensive utilization of the telephone, especially by use of what is known as the "key-town method of telephone buying and selling." By this plan each business representative can "travel" farther, reach more people, buy and sell more —and cut expenses.

Under the key-town plan the sales or purchasing representative goes to the key towns in person. From them he makes his contacts by telephone with the customers and prospects in that area. Extensive visits in person are made less often; yet by telephone more frequent and up-to-date relations are maintained.

Much time is also saved by the use of sequence calling lists whereby calls are put through one after the other with a minimum of delay; and the Bell system credit plan makes it possible for traveling representatives to have bills for calls sent to the home office, avoiding the carrying of cash and helping to keep records of contacts.

An additional service of value alike to manufacturers, retailers and consumers is furnished by the development of the "Where-to-Buy-It" service in the classified telephone directories of the Bell system.

Briefly this service consists of the inclusion in the classified telephone directory of a heading showing the name and trademark of an advertised product or service, followed by the heading, "Where-to-Buy-It," and a list of the local dealers where the product or service may be obtained by the consumer. This service makes it easily possible for a producer whose advertising has attracted the attention of a consumer, to put the prospective customer in touch with a retailer from whom he can actually make the purchase.

Long Distance Service.

There has been a steady increase in the use of long distance service. Business men are thoroughly alive to the advantages of the use of rapid long distance service with excellent transmission.

There are now relatively few long distance calls, particularly between the larger cities, where the calling party has to wait any length of time; ordinarily he stays on the line while the call is put through. This extremely fast service has resulted in a large increase in the toll business, during the first six months of the year amounting to 20 per cent.

An important factor in providing for the growth of long distance facilities on an economical basis is the use of carrier telephony. At the end of 1928 the Bell system had over 200,000 miles of carrier channel in operation on long toll routes.

With the past year a system of carrier telephony which is applicable to the shorter lines, even those well below 100 miles in length, was introduced. As a result of this innovation further economies and a substantial increase in the mileage of carrier telephone service are anticipated.

The program of the Bell system for enclosing the important long distance service in cables of practically storm-proof construction was adhered to throughout the year.

The estimate of new cable construction for 1928 provided for 1,367 miles, a record for cable construction. This estimate, however, was increased so that about 1,500 miles of cable were actually placed by the end of the year. It is now possible to talk through protected long distance telephone cable as far north as Maine, as far south as North Carolina, and as far west as Iowa and Missouri.

Additional circuits were added during the year to all three of the transcontinental telephone routes. Additional wires were strung from Omaha, Nebr., to Sacramento, Calif., by way of Denver and Salt Lake City. Additional wires were placed along the northern transcontinental route, the western terminal of which is at Seattle; and also from El Paso, Texas, to Los Angeles, on the southern transcontinental line.

The American Telephone & Telegraph Co. during the year expended a total of $47,650,000 for new construction of cable and other long distance facilities. This was over $11,000,000 more than had been appropriated at the beginning of the year and was necessary, due to the unusually rapid growth in the number of long distance calls during the first half of the year.

Telephone Circuits in Broadcasting.

The use of long distance telephone circuits for connecting up chains of radio broadcasting stations broadcasting simultaneously a single program, continued on an increasing scale in 1928.

During the presidential campaign both political parties made extensive use of radio broadcasting through chains of stations covering practically the entire country. On one occasion, during the campaign, 106 broadcasting stations were linked up by 25,300 miles of telephone wire for the simultaneous broadcasting of a single program.

Telegraph wire furnished to coordinate work of these various stations amounted to 26,400 miles, while another 22,000 miles of telegraph wire were required by the Bell system forces in maintaining and operating the equipment connected with linking together these stations. It required 273 telephone repeaters to bring the program successfully to all the stations, while a force of 800 plant employes was directly concerned in furnishing the service.

Telephone Typewriters.

The telephone typewriter service, whereby two or more typewriter printers are connected over a telegraph circuit derived from the telephone plant, was further expanded during 1928.

Among the notable installations of this service are a communication system by

telephone typewriter connecting the police stations in New York City and a service provided by the Department of Commerce at Hadley Field, N. J., and at Cleveland, Chicago and San Francisco interconnecting by telephone typewriter local radio stations and air port and weather bureau offices.

Airways Communication.

To meet the demand for facilities for communication with aircraft in flight, which is developing in connection with the rapid advance of aviation in the United States, experimental work in being carried on by the Bell Telephone Laboratories at their experimental radio station at Whippany, N. J.

A two-way radio telephone system and radio beacon have been erected there for experimental purposes. A demand has also developed for special types of communication between air ports and this is being met by the wire telephone and telegraph systems.

The Transatlantic Service.

The use of transatlantic service increased materially during the year and it is understood that it is now practically on a sustaining basis.

As previously stated, the service reaches some 13 countries in Europe in addition to all of England, Scotland and Wales. The hours of service have been substantially extended and rates charged for the service have been materially reduced. The successive extensions in the scope of the service in Europe and North America, as previously mentioned, have made possible interconnection throughout a network of 27,000,000 telephones serving a total population of nearly 330,000,000 people.

The transatlantic telephone circuit was put to a novel use on February 16 when two audiences, one in New York, and the other in London, conducted a joint meeting by telephone. The American Institute of Electrical Engineers and the British Institution of Electrical Engineers on this occasion were addressed successively by speakers in New York and London, each of whom was heard clearly by both assemblies.

A resolution expressing the satisfaction of the two societies that they had been brought together by the electrical transmission of the spoken word in this new form of international assembly was proposed by one of the speakers in New York, seconded by a speaker in London, and was then unanimously adopted by both audiences.

The increase in traffic on the transatlantic circuit was such that on June 1 a short-wave radio telephone circuit was placed in operation to supplement the previously existing long-wave facilities. This short-wave circuit was useful in helping take care of the heavy traffic during the summer and autumn. It proved so successful that additional short-wave facilities are being constructed.

Ocean Cable Possibilities.

During the fall an announcement was made that the Bell Telephone Laboratories had developed a deep-sea, long distance telephone cable capable of transmitting speech across the Atlantic Ocean.

No announcement has been made as to whether such a cable will actually be manufactured and laid in the Atlantic Ocean connecting America to Europe. It is understood that, however, the project is under serious consideration. As the manufacture and laying of such a cable is an undertaking which would take a long time to accomplish, the probability of telephoning across the Atlantic through a submarine cable undoubtedly lies several years in the future.

Submarine telephone cables have been used over relatively short distances, such as Key West to Cuba, across the English Channel, and the Baltic Sea, but it has heretofore been impossible to construct a satisfactory cable of sufficient length to span the Atlantic telephonically. The recent development in the Bell Telephone Laboratories of permalloy and a new group of magnetic alloys which have been given the name "perminvars," is understood to underlie this announcement.

The perminvars are a series of alloys of nickel, iron and cobalt which have unusual magnetic properties, making them particularly suitable for various uses in electrical communication, including continuous loading of telephone conductors. It is anticipated that in this service they will take their place beside permalloy as magnetic materials of fundamental importance in electrical communication.

Developments Allied with Telephony.

The year 1928 was a remarkable one as regards the development of inventions which are closely allied with the telephone art.

There was much talk of television and a number of demonstrations took place. Predictions were freely made that home television sets would be on the market during the fall. Such predictions, however, did not become a reality. As indicating the advancement made in the art of television, one inventor was able to transmit an image across the Atlantic by radio. Another successful demonstration was that of the General Electric Co., which broadcasted several scenes that were successfully picked up at a receiving station.

Improvements are being made in the equipment and methods used in television and undoubtedly something practical will be evolved. The present equipment is too expensive to be commercially practical.

The so-called "talkies" was a development of the year which is attracting great attention. Something like 1,000 theaters are equipped with equipment for showing the talking movies and several thousand other theaters have let contracts for the installation of the equipment. The "talkies" are a development of the Bell Telephone Laboratories and, therefore, one of the by-products of the telephone research. The "talkies," as they are popularly called, are developing into a considerable industry for which much is predicted in the future.

Telephones and Telegraphs.

A step in the bringing closer together of the telephone and telegraph systems of the United States was taken when a series of non-exclusive contracts were entered into by the American Telephone & Telegraph Co. and the Western Union Telegraph Co. and the Postal Telegraph & Cable Corp. These agreements make provision for furthering the development of electrical communications along lines made possible by the latest devices and methods developed in the research laboratories of the Bell company.

One of the new contracts makes the long distance telephone lines of the American Telephone & Telegraph Co. available for the transmission of telegraph messages handled by these two telegraph companies.

Further utilization of telegraph lines will be made possible under another of the contracts which provides that the telegraph companies may lease apparatus developed in the Bell laboratories, by which a single pair of telegraph wires may be made, under certain conditions, to serve as several telegraph channels.

Still another of the contracts makes available for the customers of the two telegraph companies the use of the tele-

phone company's telephoto system for the transmission of facsimile messages between cities in which stations for the transmission of pictures by wire are maintained by the telephone company. At present telephotograph service is available between New York, Boston, Atlanta, Cleveland, Chicago, St. Louis, San Francisco and Los Angeles.

In entering into this series of non-exclusive contracts, the two telegraph companies have taken advantage of the offer of the American Telephone & Telegraph Co. to make available to telegraph companies certain developments which have been worked out by telephone engineers that are of particular practical value to the telegraph business. In addition to the devices already mentioned, the Bell laboratories have worked out improvements which have been applied to submarine telegraph cables, as a result of which it has been possible to obtain a large increase in the capacity of the ocean cables for handling telegraph traffic.

European Development.

During the year great steps were taken in the telephone development of Europe, particularly in the extension of long distance lines. Not only were a number of new long distance telephone circuits opened between various countries in Europe, but the service was greatly improved.

The length of time taken to secure connections on long distance calls has been an object of adverse comment for a number of years. The waiting time has been reduced to a considerable extent so that Europe is now getting its long distance connections within such compartively short time that the service is commencing to attract more business because of the improved handling of calls.

London at the close of the year had about 610,000 telephones, an increase of approximately 52,000 telephones for the year. There are 130 telephone exchanges now in operation and 37 additional ones are under construction in the London area. London has more than one-third of the total telephones in Great Britain and northern Ireland.

On September 17, the 50,000th telephone was installed in service in Brussels, Belgium. This represents an increase of about 75 per cent over the number of stations in the city at the end of 1921.

The first automatic exchange in Paris was cut into service on September 23, about 6,000 lines being involved. During the coming winter, four new automatic exchanges are scheduled to be cut into service. The entire conversion of the Paris telephone system will be completed in 1936 with a capacity of 480,000 lines.

Automatic exchanges in France are at present in operation at Nice, Angers, Marseilles, Le Havre, Vichy, Rennes, Montpelier, Lyons, Bordeaux, Troyes and Colmar.

The rehabilitation of the systems in other countries of Europe is going forward gradually, but the great progress during the year was centered on the long distance lines.

The first cables of a subterranean system now permit rapid communication from France with Switzerland, central Europe, Scandinavia, the Netherlands and Belgium. The service time between Paris and Berlin, Zurich, Vienna, Prague and Milan has been lowered to about ten minutes; to two hours for London, Brussels, Amsterdam and Madrid.

Methods developed in America are being adopted abroad. For instance, in order to educate and acquaint the public with the various aspects of the telephone service in Glasgow, Scotland, popular lectures and demonstrations on a model switchboard were given to about 4,000 people during the past year. Prior to the opening of the first automatic exchange in Paris, printed instructions were circulated and a demonstrator called on each subscriber and gave a full explanation regarding the new method of obtaining telephone connections.

While details are lacking, reports from Berlin, Germany, state that regular radiophone communication with Buenos Aires, South America, was opened on December 10 from Berlin, Hamburg and Frankfort-on-Main. This service was extended December 21 to all German postoffices.

About the middle of the year it was announced that telephone conversations had taken place between Holland and Java, in the Dutch East Indies, a distance of 8,000 miles.

Last week dispatches from The Hague stated that early next month Dutch subscribers would be able to talk from Amsterdam, Rotterdam, Utrecht or The Hague to any one of the four leading towns of the Dutch East Indies. The rates will vary from $12.50 minimum for a call which must be put in two days in advance to a maximum rate for special calls put through immediately.

Undoubtedly on these long distance calls from Germany to South America and from Holland to the Dutch East Indies, a development of the Marconi beam wireless system is used. Experiments have indicated that this system of wireless is not affected to a great extent by atmospheric conditions and is quite reliable.

During the year experiments in the development of a short wave beam wireless have been conducted between England and Canada. This month it was stated that a stage of development has been reached in which one set of apparatus and aerials can be used to conduct simultaneous telephone and telegraph services.

These experiments have demonstrated, it is understood, that two or three wireless telegraphic and a wireless telephone message may be sent in either direction at the same time over the same radio circuit.

World Communications.

During the year there has been a drawing together of communication interests. The International Telephone & Telegraph Corp. purchased control of the Postal system, or Mackay companies, thus giving it access by telegraph and some long distance telephone circuits to various points in the United States. Many reports were circulated regarding a combination of these interests with the Radio Corp. of America, but while the matter was discussed the present federal laws forbid mergers of cable and radio companies.

In Great Britain, a merger is under way of the various British cable and radio companies which will lease the government's cables and the British postoffice beam radio stations.

These various moves are all apparently steps in forming the lines in an impending battle for the control of the world's communications. With the great expansion of telephone service, which has already brought America in contact with practically all of Europe and parts of Africa, and which will shortly bring North America into telephonic connection with South America, the question of the control of these communications is being brought to the front. Naturally whatever country that obtains control will benefit from the business resulting from supplying the communication equipment.

Telephone Transmission Testing

Simple Tests Which Will Be Found Useful in Indicating Defects of Circuit Transmission—Microphone Howler and Its Manner of Operation—Diagrams Illustrating Method of Connecting Telephones to Make Various Tests

By Ray Blain

The many advantages of conducting periodic transmisson tests on telephone equipment are well known, but the cost of the regular testing apparatus usually places it beyond the reach of the average small telephone company. I recently completed a series of tests with instruments made up of parts, such as may be picked up around any exchange, with the addition of a few parts purchased at a small cost.

While these tests do not show transmission equivalents as in the standard methods, they will be found useful in determining the efficiencies of the various circuits on a comparative basis and will indicate defects impossible to find by the various methods of direct current testing.

On any kind of transmission test it is first necessary to supply a measuring current of about the same frequencies as those set up by the voice under actual operating conditions. On the tests described in this paper the currents were supplied by

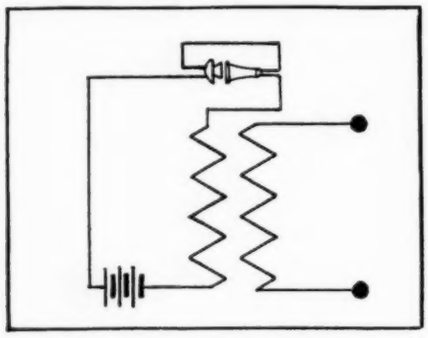


Fig. 1. Microphone Howler with Transmitter and Receiver in Series.

one of the earliest types of oscillators known as the "microphone howler" or tone.

This oscillator consists of an ordinary telephone transmitter, receiver, induction coil and battery connected as shown in Figs. 1, 2 and 3. Of the three different circuits shown, Fig. 3, which is made up of two induction coils, appeared to have a slight advantage over the other types. The volume control in the output of this set consists of an ordinary 30-ohm radio rheostat and will be found very useful in controlling the strength of the tone in the various tests which will be described later.

The microphone howler operates as follows: When direct current from the battery flows through the transmitter, it disturbs the carbon granules. This changes the resistance of the transmitter slightly and causes a corresponding change in the value of the direct current in the circuit. This change in value of the direct current causes a transformer action to take place in the induction coil and currents are induced in the receiver and the output winding.

The induced currents in the receiver cause a movement of the diaphragm

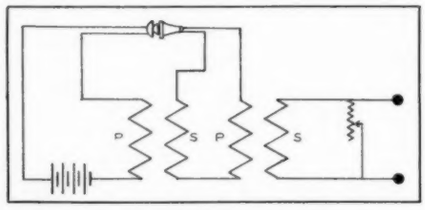


Fig. 3. Howler with Two Induction Coils in Circuit.

which is transmitted by the air coupling to the diaphragm of the transmitter, causing it to vibrate in unison. This movement of the transmitted diaphragm again varies the resistance of the carbon gradules and causes another change in the direct current value in the circuit.

These operations continue as long as the direct current circuit through the transmitter is closed, and a steady hum can be heard in the output circuit. This current will not be of pure wave form, nor can its frequency be controlled as with the vacuum tube oscillator, but it will be found adequate to perform the various tests hereinafter described.

Fig. 4 indicates the method of connecting the microphone howler or tone set to pick up unbalanced or high resistance connections in a metallic circuit, either cable or open wire. To make this test a special receiver must be provided as follows:

Use an ordinary receiver, preferably the watch-case type, connect a center tap to the joint between the two windings of the magnets of the receiver. It is usually necessary to drill a small hole in the back of the receiver shell and to use a small

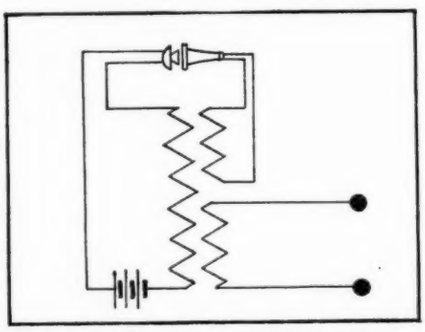


Fig. 2. Howler with Transmitter and Receiver in Separate Circuits.

bolt for a binding post. Connect the center tap to ground and the two regular terminals to the line under test. Place a short-circuit on the line at the distant office and connect to one side of the tone output. Connect the other side of the tone to the ground.

If the line is in good condition, each wire will be of equal resistance and each winding of the receiver will carry the same amount of current to the ground. Under this condition one winding will neutralize the other and no tone will be heard in the receiver.

If there is a high resistance joint in one side of the line, more current will pass through one winding of the receiver than the other and a tone will be heard. The greater the unbalanced condition, the louder will be the tone.

This same arrangement can also be used to test the multiple in a large switchboard, and will be found very useful in tracing down noise trouble and loose connections.

Before starting the unbalance test it is best to measure the resistance of each

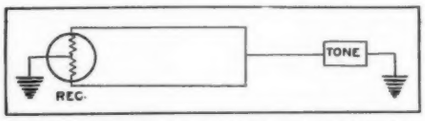


Fig. 4. Connection of Howler to Pick Up Unbalanced or High Resistance Connections in Metallic Circuit.

winding of the receiver, for in some cases a variation as much as six ohms between the coils will be noted and this will defeat the object of the test. After a few attempts I was able to find a receiver that both coils showed equal.

If no Wheatstone bridge is available, a receiver can be tested, after the center top is connected, by placing it in a short length of wire in the same manner just described to test unbalances. With all connections tight, note that very little if any hum can be heard in the receiver indicating that the coils balance.

Fig. 5 shows the circuit of an audibility meter of the type commonly used for radio purposes. This is just a straight impedance, calibrated into steps from about 1 to 30. With this meter when the rheostat is on No. 1 contact, there is still a fixed resistance in the circuit. On the telephone tests this arrangement is not necessary and, if there is not an audibility meter available, an ordinary radio potentiometer of 5,000 ohms or more resistance, if provided with a dial properly calibrated, can be used with equal reliable results.

For testing inter-office trunks or toll lines, the tone can be set up in the distant office using a predetermined voltage and volume and connected to the first line to be tested. The audibility meter can now

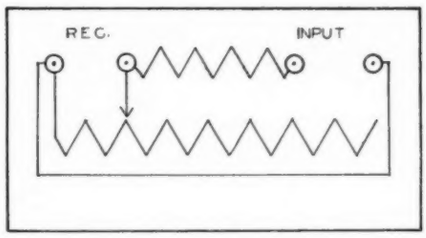


Fig. 5. Circuit of Audibility Meter of Type Commonly Used for Radio Purposes.

be set up at the second office to determine the volume or audibility of the tone received. In other words, the audibility meter is adjusted by cutting out resistance until a point is reached where the tone fades away. The last contact on which the tone can be heard should be called the audibility of the signal received.

The receiver used on this set can be of the ordinary telephone type, or the high resistance ones used for radio purposes. Some individuals seem to have better results with one type and some with the other. Circuits connecting two offices can be compared from time to time by using the same setting of the tone set, or readings taken at one time can be compared with readings taken at another to find that the transmission qualities do not vary. In some cases it may be desirable to connect two circuits together at the distant office so that both the tone and the receiving equipment is under the control of the tester.

To test for crosstalk connect the tone on one circuit and then listen in on the other; reduce the tone by shifting the arm of the audibility meter until it fades out. This will indicate the crosstalk value.

The tone and the audibility meter will be found very useful in testing the transmission of cord circuits on either magneto or common battery switchboards. In order to obtain actual talking conditions on some common battery cord circuits, it may be

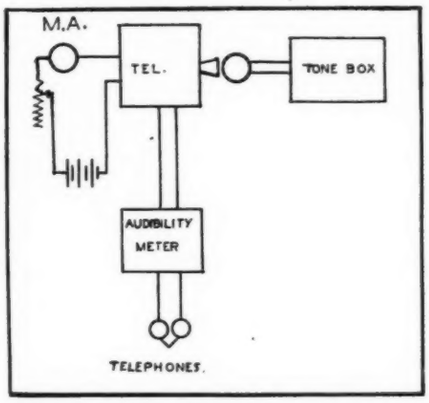


Fig. 6. Method of Connecting the Tone to a Receiver in Front of Telephone Transmitter to Observe Operation of Set.

necessary to connect the tone to the apparatus through a repeating coil. When testing through auxiliary apparatus, such as one or more repeating coils, the volume control on the tone can be shifted to increase the tone to the usual value if necessary.

On any test made with this tone a cut-out will be instantly detected by a short break in the tone, whereas an ordinary buzzer will many times carry over a loose connection. The tone set will be found ideal for testing cords of all kinds for cut-out trouble. It is always best to have the tone in another room if possible and to connect it to the apparatus by a length of twisted pair wire, thus preventing the hum in the same room in which the test is being conducted.

Fig. 6 shows a method of connecting the output of the tone to a receiver which is held in front of a telephone transmitter to observe the operation of the set. On all tests of this nature, the 22-volt exchange battery was used and the current flow limited to 50 milliamperes by the use of a small rheostat connected in circuit. A millameter was also placed in the cir-

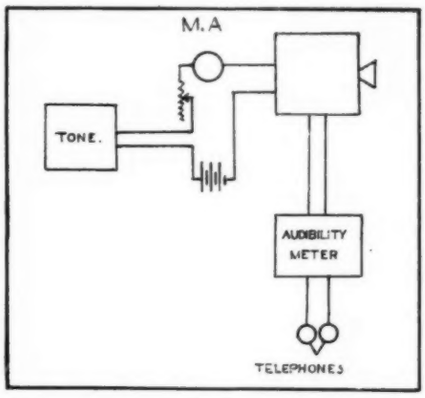


Fig. 7. Another Method of Connecting Tone to Telephone for Observing Operation.

cuit so that the current flow could be observed at all times.

Fig. 7 shows another method of connecting the tone to a telephone to make practically the same test as described in Fig. 6. In some cases it seems to give better results.

Fig. 8 gives a method of connecting two telephone instruments so that the tone has its output connected to a receiver which can be held in front of either transmitter to compare the audibility of each instrument. The double-throw switch makes it a simple matter to shift the listening set from one instrument receiver to the other. For example, when the tone fades out on No. 1 instrument the meter can be switched to No. 2 instrument, and the tone can be heard faintly, indicating that No. 2 instrument will give slightly better transmission than No. 1.

Due to the hum in the receiver, which is held in front of the transmitter on this test, it will probably be necessary to extend the line from the audibility meter to the telephones in another room to get a good, clear fade-out. A helper can make adjustments, or change the position of the switch, at the direction of the observer.

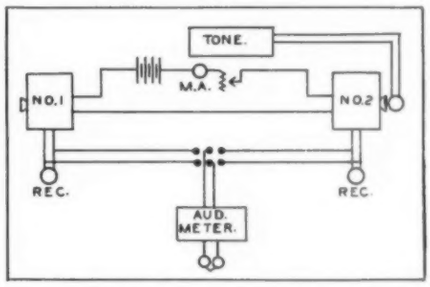


Fig. 8 Method of Connecting Two Telephone Sets for Comparing Their Audibility.

If the observer is listening in the same room with the humming receiver, the tone may fade out through the audibility meter but, being heard through air vibrations, it will appear that it is coming through the receiver.

In Fig. 9 is indicated another method of connecting the two telephones to make practically the same test as described in Fig. 8. This has the advantage, however, of supplying the tone in equal volume to both sets, and proves the efficiencies of the receiving circuits of the instruments better than the arrangement in Fig. 7, which is more adapted to the transmitter circuits.

On various tests conducted on several different types and makes of instruments, the audibility was found to be about equal, indicating that all of the instruments on the market today, if in good condition, will give satisfactory transmission. However, when a very old instrument, or one with a packed transmitter, was connected with one of the newer types as in circuits of Fig. 8 or Fig 9, a difference was readily detected.

When the two instruments which had shown up different on this comparative test were connected up and used to make a local test call, the difference could not

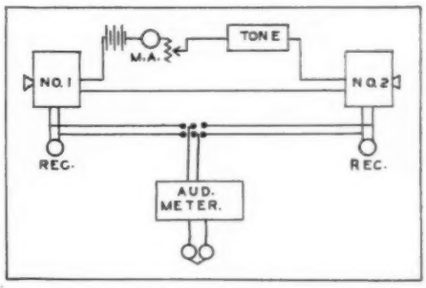


Fig. 9. Another Method for Comparing Audibility of Two Telephone Instruments.

be detected and both apparently gave good service. This, I believe, proves that some method of testing transmission is necessary to determine whether apparatus is functioning as it should and to pick up defects that cannot be detected from the usual observation of the service.

It is not claimed that these simple tests

HAPPY NEW YEAR

By Miss Anne Barnes.

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

The old year will soon end . . . a new year begin. As we stand on the threshold of this new year, each one of us will turn and look backward to review our accomplishment in the old year, as we have done in former years—as long as we can remember, it seems. Whatever that backward look tells us, we always face forward again with a grim determination to start right and keep going right, no matter how much we may have to sacrifice our personal inclinations.

During this brief retrospect, we are conscious that there is a harmony between *desire* and *duty*. It seems to me that we are not so keenly conscious of this connecting link at any other time of the year. As we pause, we breathe a wordless resolution or two which we mean to keep. Sometimes we do; more times we do not.

"Tomorrow," we promise ourselves. And we mean it—today.

"But," says one who likely knows from personal experience, " 'Tomorrow, and tomorrow, and tomorrow, creeps in this petty pace from day to day.' "—Young.

The farther we get from the day of our good resolutions, the less important they often seem to us.

"But I cannot find the time," we alibi. Most of us who are employed work eight hours a day; that time we cannot count on.

Whenever I see a man or woman on a train, street car, or at breakfast, reading a newspaper or book, I know that he or she is making the most of these spare minutes, and other spare minutes, too, that I do not know about.

We are all ambitious to do something worth while for ourselves, but the trouble is that most of us just *feel* ambitious. If we are ever going to realize our desires, we must *be* ambitious.

If we work only to provide a means of living and enjoying, this is merely existence. The time to put our New Year's resolutions for self-betterment into effect, we will find on the outside of our working day. If we really want to do something for ourselves, it will help us to remember every time we ruthlessly waste time, that time wasted is mere existence; used, it is life.

Welcome, New Year! With joy I greet thee,
With empty hands for thee to fill.
What wilt thou bring? I know thy answer.

Whatever joy or grace myself shall will!
Surcease of sorrow, boon of sweet forgetting,
My soul's enrichment, and my heart's great need.

All that I ask, or dream, or e'er have yearned for,
If I but will, may now be mine indeed.
Welcome, New Year!

—Louise R. Wells.

are all that they should be or that they are near as efficient as those of the ear-balance method conducted with regular transmission test sets. It is believed, however, that these tests if properly conducted will bring out defects in transmission that cannot be detected by any direct current testing method, and will make possible the clearing of trouble before it is reported by some subscriber who has difficulty in talking over a connection.

Christmas Party of Lincoln (Neb.) Telephone & Telegraph Co.

The Lincoln Telephone & Telegraph Co., Lincoln, Neb., was host to more than 500 of the employes of its exchanges at Lincoln, University place, College View and Havelock at its annual Christmas party given five days in advance of that holiday. J. H. Agee, general manager, welcomed the employes in a brief speech in which he expressed appreciation of the loyalty of the workers and of the desire of the company to show such appreciation in this among other ways. Thad Cone responded for the employes.

H. F. McCulla, assistant commercial superintendent, acted as master of ceremonies, introducing the participants in the progam over the public address system. Musical numbers were supplied by Mae Marks, Lillian Rank and Mildred Miller, and tap dancing by Doris Powell and Jennie Buckley. The general committee of arrangements was headed by Fred Strasser.

C. W. Motter, public relations director, called forward all who had taken part in the industrial baseball league, and presented trophies to members of the successful team.

George Barney, Ray Misner, Irving Forke, Marguerite LaRue and Marguerite Hall, winners locally of the revenue development campaign recently held by the company, were rewarded suitably by D. G. Bell, manager for the Lincoln exchange. Santa Claus, impersonated by A. B. Smith, brought presents for the children present, and after motion pictures were shown, the floors were cleared for dancing.

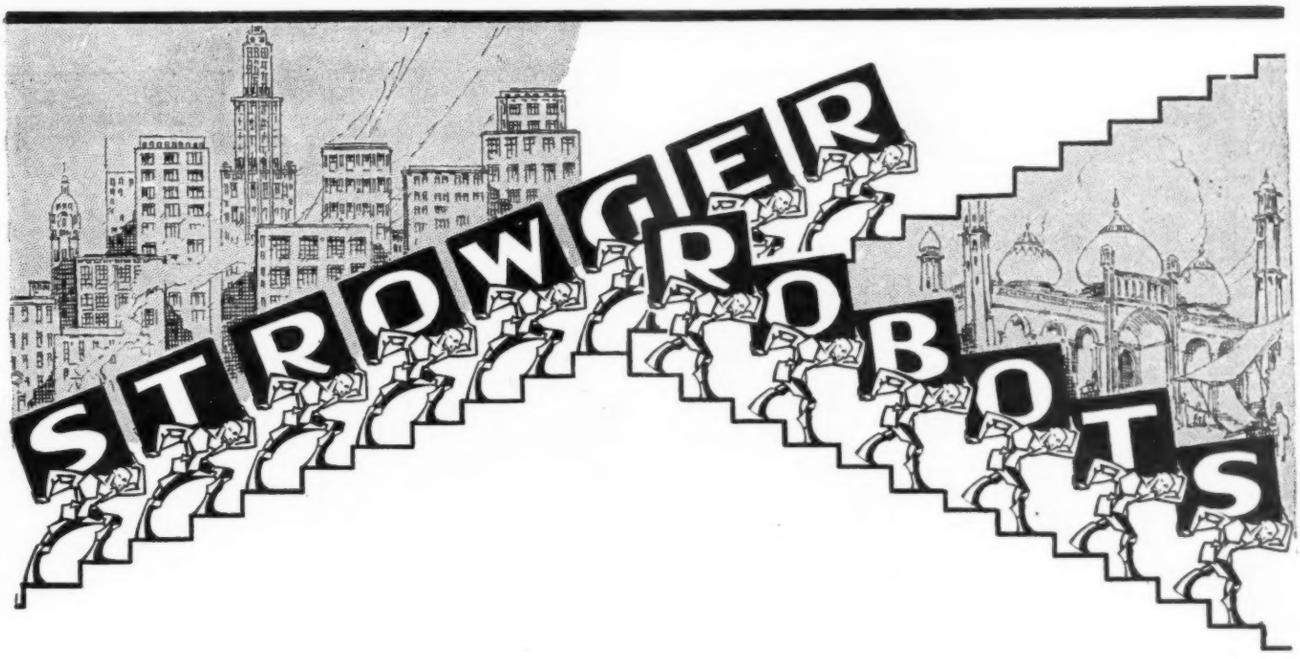
Wisconsin's Annual Convention at Madison February 20 and 21.

The annual convention of the Wisconsin State Telephone Association will be held in Madison at the Lorraine Hotel, on February 20 and 21.

This year the convention has been cut to two days but every effort is being made to make them of interest to every telephone operator. W. L. Smith, of Neillsville, Wis., is secretary of the association.

New York Convention to Be Held in May at Rochester.

The Up-State Telephone Association of New York, President J. G. Ihmsen has announced, has scheduled its annual convention for May 22, 23 and 24, 1929. It will be held at the Seneca Hotel in Rochester, N. Y

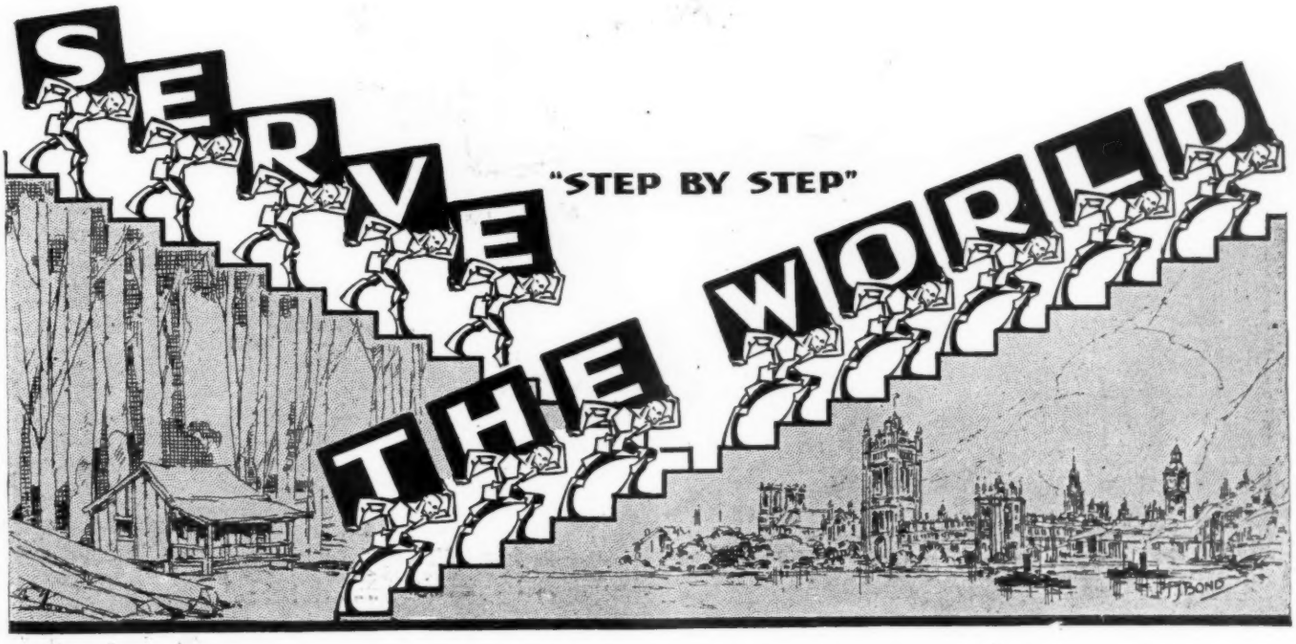


Automatic Telephone Manufacturing Company, Ltd.
Strowger Works, Liverpool, England

AND

International Automatic Telephone Company, Ltd.
London, England

Extend Cordial Season's Greetings
To All Friends the World Around



Caracas, a city of over 100,000 population, is the business and commercial center of Venezuela as well as its capital, and is one of the most modern and progressive of South American cities.

STROWGER AUT
TELEPH

eat Orders Confirm Strowger omatic Success in Caracas

UELA'S capital city, Caracas, has found in Strowger atic telephone equipment the most satisfactory solution o ephone needs. Beginning with 1000 lines of Strowger Aut equipment installed in 1927, the Venezuela Telephone Cor has installed and placed in service 3000 more lines during 92 ging the present total up to 4000 lines of Strowger Aut equipment in operation. An additional 2000 lines is now bei alled which will give Caracas 6000 lines of equipment vit ort time, and will place the city's entire telephone system on utomatic basis.

The t city in South America, Buenos Aires, has experienced Str Automatic operation since 1919, and the conspicuous suc this equipment in that city was one of the deciding fac its adoption for Caracas. Sao Paulo, Brazil, also has rec dopted Strowger Automatic operation. These ins s indicate that the more progressive South Am cities are quick to adopt time-tried and proven dev nts which add to the convenience and eff f modern life.

tomatic Electric Inc.

Factory and General Offices:
West Van Buren Street, Chicago, U. S. A.
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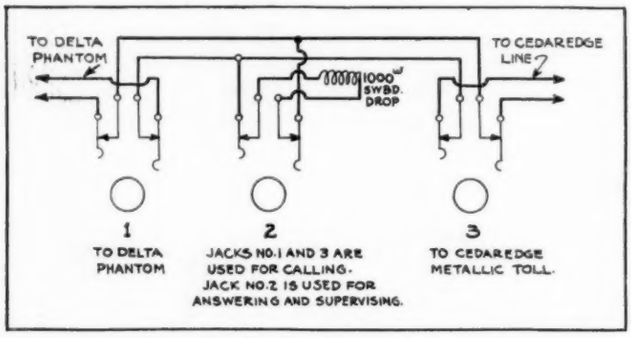
Here and There in Telephone Work

Phantom to Metallic Connections for Extra Toll Service.

By H. F. Schulte,

Manager, Delta, Colo., The Delta County Cooperative Telephone Co.

Having need of another toll circuit from Delta exchange to our Cedaredge exchange and having no through lines available for phantoming the entire distance, the writer helped the situation very much and with the minimum of expense. We pass this on for the help some one else may derive from our experiences.


TO DELTA PHANTOM
TO CEDAREDGE LINE
1000Ω SWBD. DROP
1
2
3
TO DELTA PHANTOM
JACKS NO. 1 AND 3 ARE USED FOR CALLING. JACK NO. 2 IS USED FOR ANSWERING AND SUPERVISING.
TO CEDAREDGE METALLIC TOLL.

Arrangement of Connections of Phantom with Physical Circuit Provided An Extra Circuit Between Two Exchanges.

The mileage of line from Delta to our Eckert exchange consisted of four No. 12 iron wires, comprising two metallic toll lines 12 miles in length. These were phantomed. No new transpositions were cut-in on any of the circuits. The existing transposition were of the simple A B type.

Our Cedaredge exchange is situated five miles from the Eckert office and is connected to the Eckert exchange by four metallic toll lines. After the two existing toll lines were phantomed between the Delta and Eckert exchanges, one of the toll lines of the Cedaredge group was selected and connected to the phantom circuit in the manner shown in the accompanying sketch.

The quality of the transmission was superior to either of the other metallics. This arrangement gave us an extra line to our exchange at Eckert, and the use of one of the toll lines between Cedaredge and Eckert.

Lincoln, Neb., Company Arranges for Employes' Insurance.

The Lincoln Telephone & Telegraph Co. has made a contract with the Travelers' Insurance Co. of Hartford, Conn., to insure all of its employes who will take advantage of the plan offered. This is not the usual group insurance plan, in which the employer and employe share the cost between them. There are no reduced rates and the company does not contribute anything except its services in getting the insurance and in making it easy for the employe to pay for it.

The plan will not modify or change or compete with the employes' benefit plan, General Manager John H. Agee announces. The benefit plan is merely a method of readjusting living conditions, and does not protect the future of any family. This latter will be supplied by the insurance offered.

Certain concessions have been made by the insurance company. It will insure women at the same rate as men; will make no extra charge where an employe is engaged in hazardous work, and no medical examination is necessary. The employe merely takes out the insurance desired, if he cares to do so, and the company will thereafter take care of all details and make payments through deductions in pay.

No person is solicited unless they ask for an interview with the insurance man. Full details of the plan have been sent out by President Frank H. Woods, together with a card which, when signed and returned, will put the employe in touch with the insurance representative.

If a policy is desired, the application is made out and signed, together with an authorization to the company to make the deductions as listed from salary, which will be monthly. The company will remit the premium money to the insurance company. The employe is advised to counsel with the insurance salesman as to what kind of a policy and the amount, and take out only what can be afforded.

"This plan has added another link to the chain of our thrift activities," says Mr. Agee, "and makes it possible for everyone to consider his or her personal circumstances and, through company cooperation, work out a complete program to meet individual needs. The plan has been worked out so fully that there will be no difficulty or bother attached to it whatsoever. Its simplicity will commend it to all."

The Telephone Central Office Dynamo—Armature Winding.

By John A. Bracken.

Toothed slots are stamped in the round, single sheet-iron plates composing the central office battery charging dynamo armature core so that when these plates are affixed to the armature shaft, they form continuous slots. Usually there are many slots, which are near each other. These slots are for the reception of the armature conductors or windings and are thoroughly insulated.

The central office battery-charging dynamo armature windings, as they are called, consist of a great number of coils of insulated copper wire laid in the core slots and having the ends soldered together so that the whole armature winding forms a circuit closed on itself. This is called a closed coil armature in contrast to the open coil type, which is, for instance, to be found in the magneto generators of rural line telephones.

The armature is rotated between the north and south poles of the magnetic field by a source of outside mechanical power and an E. M. F. is induced in the individual windings which set up a current in the external circuit.

The current occasions an electrodynamic force which opposes the motion of the armature. The work done by the outside driving power in overcoming this opposition is the work which maintains the current in the dynamo charging circuit.

It is now necessary to examine how the different electromotive forces generated in the coils act toward one another. First of all, it is important to understand about the course of lines of magnetic force. To the latter coming from the north and to the south poles, a path is offered through the armature. They can either make a bend and pass through both halves of the iron core, or they can go the shortest way—directly through the interior of the core—to the south pole.

The first path offers a much lower magnetic resistance, because the path is only through iron having a small magnetic resistance. Hence most of the lines of magnetic force will pass around the iron, and a small number will go through the inside of the armature.

The next step is to distinguish between the outer and the inner conductors of the armature winding. The outer conductors cross the total number of lines of magnetic force in the armature bore (the space between the magnetic pole pieces of a dynamo) in passing the north or south pole. The result is that in the outer conductors a large E. M. F. is generated. In all outer conductors passing the north pole, an E. M. F. in one direction is induced. In the conductors passing the south pole, an E. M. F. in the opposite direction is induced.

From the inner conductors and the lateral (side) parts of the windings, very lit-

tle E. M. F. is obtained, because very few lines of magnetic force cross them. Therefore, the really effective portion of each winding is the outer conductor. The conductors passing in the space between the upper and lower tips of the magnetic poles, called the neutral zone, are ineffective, these and the other conductors of the armature winding serving only for connecting each conductor with the next one. By means of these connections the electric pressures produced by the outer conductors within the embrace of the magnetic poles are placed in series.

As soon as an outer path is provided, the pressures combine and send current in the same direction to feed the outside circuit. This is accon plished by means of special parts, called the commutator and brushes.

Cable Capacitance Varies With Test Conditions.

By Arthur L. Albert, *Instructor of Electrical Engineering, Oregon State College, Corvallis, Ore.*

The rapid increase in long distance telephone communication has made practicable the use of many long distance toll cable circuits. In these cables the capacitance is relatively high and the circuits must be loaded to prevent excessive attenuation of the current and voltage waves.

This is accomplished by introducing inductance coils in series at regular intervals along the cable circuits. For coils of a given inductance, and for a certain type of loading, the distance between the loading coils is determined by the capacitance of the cable.

Measurements when tests are made show that the mechanical condition of a cable affect the capacitance of the cable circuits. It was found that the capacitance of a cable when on the cable reel was different from the capacitance when the cable was in an underground cable duct. The average capacitance of 40 circuits in the cable was 0.0607 microfarad per mile when on the reel, and 0.0599 microfarad per mile when in an underground cable duct.

It was also found that the capacitance decreased only for the cable pairs in the outside layers near the cable sheath. The wires in a telephone cable are insulated with layers of dry paper, and thus variations in the mechanical forces acting on the cable sheath will cause variations in the relative positions of the conductors, and, therefore, changes in the capacitance. Only the cable pairs in the outer layers were found to be affected, because only the outer layers would be greatly influenced by the mechanical stresses due to bending.

Although it was impossible to make these tests at the same temperature, the conditions were approximately the same, and temperature variations are not thought to greatly influence these results.

It is particularly important in loading circuits that the coils are placed exactly at the proper point, and, therefore, the cable capacitance must be carefully measured before the loading points can be determined.

As a result of this investigation, it follows that if measurements are made while the cable is on the reel instead of with the cable in the normal position—that is, laying out straight—the results will be in error.

This study further indicates that the spacing computed for the coils will be about 1.3 per cent too high. This error would greatly affect the location of manholes for underground installations and would, therefore, be of importance to telephone engineers.

While these tests were confined to paper-insulated telephone cables, it is probable that a similar capacitance variation with mechanical conditions will also be found in power cables.

New Exchange at Lockwood, Mo., Holds "Open House."

The Central West Missouri Telephone Co. held a formal opening of the company's new plant at Lockwood, Mo., recently, approximately 500 persons visiting the office. On the outside of the new exchange building a large paper mache telephone, loaned by Kellogg Switchboard & Supply Co., was on display.

The construction program at Lockwood showed an expenditure of $15,000. The plant is one of the most up-to-date that is to be found in a town of that size in the entire state. Poles were removed from the town and replaced by all new underground cables and in practically every instance these were placed in the alleys. Every pole and wire was removed from the business district.

In the case where the lines came from the cables and the connection made to a building, the poles and wires are all new and the former are of uniform height. In every instance where a telephone was not giving perfect service it was replaced.

The new building housing the plant is modern in every detail. An attractive warehouse of stucco construction, identical to the office building, was erected on the rear of the lot. A Kellogg switchboard of the 400-AL two-position type magneto was installed. It is wired for 400 magneto lines with 290 equipped, 40 rural lines with 30 equipped and 30 double lamp supervision cord circuits.

Officers of the Central West Missouri company attending the opening were: H. F. Rehg, commercial superintendent; I. F. Krehbiel, commercial engineer; and Frank Foote, construction superintendent, all of Salina, Kans. On the following day a general meeting of the company's eight exchanges of the local districts was held at Lockwood, 45 people being present. M. L. Grable, of Ash Grove, superintendent of the district, was in charge. The towns represented were: Lockwood, Ash Grove, Jasper, Mt. Vernon, Willard, Walnut Grove, Morrisville and Everton.

Mussolini Acts to Prevent Discharge of Married Operators.

The newspaper Il Secolo of Milan, Italy, on December 15, said that intervention by Premier Mussolini had saved 30 telephone operators their positions.

The girls were discharged when they disobeyed the rules of the company by getting married. The premier heard of the discharges and asked officials to reinstate the operators. The rules have now been modified to permit any employe to marry.

New Exchange Building of the Central West Missouri Telephone Co. at Lockwood, Mo., on Occasion of Recent "Open House."

The Locating of Anchors for Down Guys

Discussion as to Proper Distance From Pole of Anchors for Down Guys—Tension on Guy Strand Greater as Distance From Pole is Decreased—Demonstration Before Annual Convention of the Illinois Telephone Association

By J. H. Mathews,

Assistant Chief Engineer, Illinois Commerce Commission, Springfield, Illinois

In locating anchors for down guys should consideration be given to the distance from the pole?

To those who have studied this question, or who have had much experience with the performance of guys, the answer is obviously "Yes."

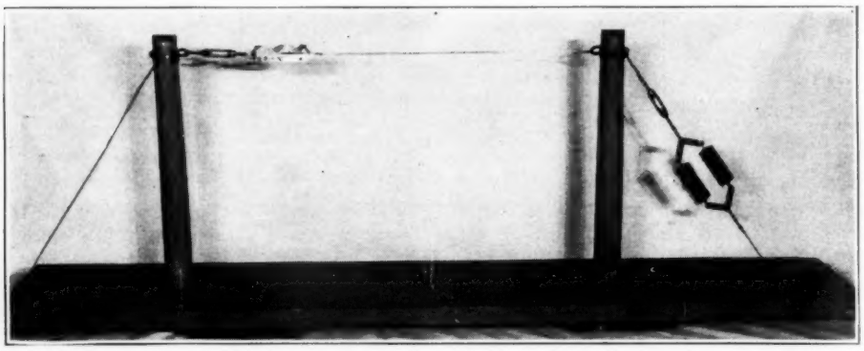


Fig. 1. Model of Overhead Line Used at Convention of Illinois Telephone Association to Demonstrate Tension on Guy Strand.

It is generally known that the tension in the guy strand becomes greater as the distance from the base of the pole is decreased but usually it is not realized just how much influence the distance has. The purpose of presenting the discussion in the manner chosen was to try to make the answer obvious to all without resorting to a mathematical discussion.

For this purpose a model, as shown, Fig. 1, was used. It represents a section of a telephone or other overhead line consisting of one overhead span and a down guy to support the unbalanced pull on the pole due to assumed dead-ended wires, corner, angle, transverse loading, or for any other reason.

The height of the pole in the model is 20 inches (to correspond to a 20-foot pole) and loops (corresponding to anchors) for down guy attachments are located 3, 4, 6, 8, 10, 15 and 20 inches from the center of the pole base, at which point the pole is hinged. Scales in the horizontal wire and in the down guy show respectively the pull, P, on the pole and the tension, T, in the down guy (See Fig. 2).

By means of turnbuckles the pull in the overhead wire was adjusted in each case to eight pounds, and the tension in the down guy read from the scales for the different values of lead. Results of these readings (multiplied by 1,000 to make them correspond to likely telephone line figures) were plotted on a large chart to show the effect of varying the lead.

Theoretically the tension, T, may be determined from the equation:

$$T = \frac{P}{\text{Sine } \theta} \quad \text{or} \quad T = \frac{P\sqrt{L^2 + H^2}}{L}$$

where T = Tension in guy; P = Pull on pole; L = Lead; H = Height; and θ = Angle between guy and pole.

Values calculated from this equation based on a pull of 8,000 pounds are shown in Fig. 3. Scale readings secured in the experiment are plotted on the same sheet for the purpose of comparison. These are shown by small circles and correspond very closely to the theoretical values in spite of errors that might reasonably be expected in a relatively crude test such as this.

To better demonstrate practically the enormous tension developed in the down guy when anchored near the pole, a heavy weight was fastened to the end of the guy, the latter being passed loosely through a hole in the baseboard about three inches from the bottom of the pole. It was found that the pull of an ordinary wrapping string in the overhead horizontal position could in this manner easily sustain a weight of over 50 pounds.

The values secured in the experiment as

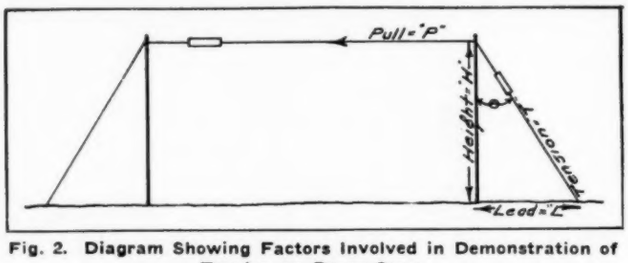


Fig. 2. Diagram Showing Factors Involved in Demonstration of Tension on Down Guys.

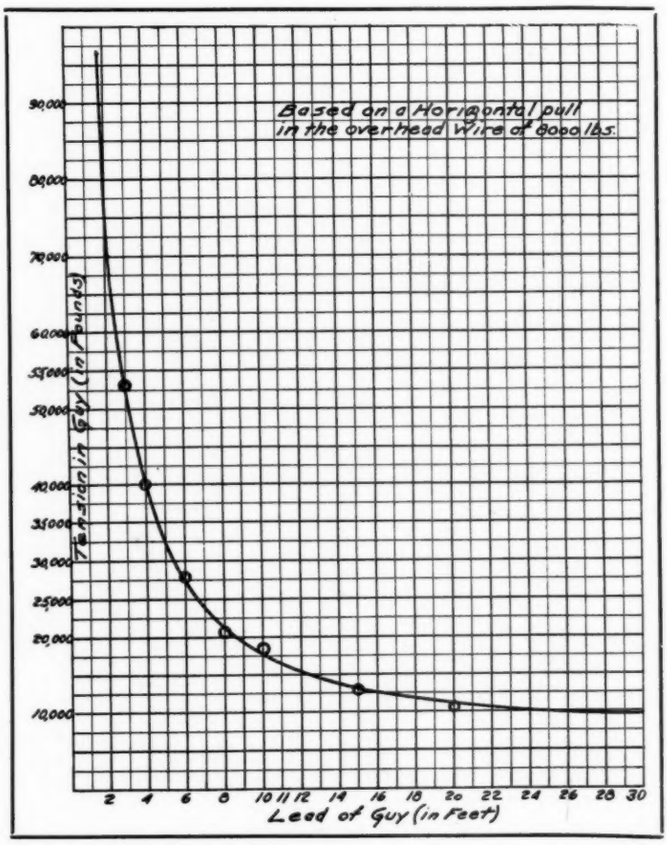


Fig. 3. Curve Showing How Tension on Down Guy Varies with Distance of Anchor from Pole.

that very little is gained by increasing the lead when the guy is located some 20 feet from the base of a 20-foot pole; that is, when the ratio of lead to height is unity or greater.

The necessity, however, of securing all the lead possible is quite important at lesser values of lead and becomes quite critical when the lead gets below about six feet or below a ratio of 30 per cent. At three feet, the tension in the guy amounts to nearly 55,000 pounds for an 8,000-pound pull or to five or six times what it is when the lead is about 20 feet.

Besides making use of the model in illustrating the discussion described, it has been used and found valuable in studying the effect on guy tension of raking the pole, holding the guy away from the pole in different positions by inserting horizontal braces of different lengths between the guy and the pole and by other situations found in practice. These simple studies have brought out some interesting information which rarely receives attention either theoretically or practically in designing or installing guys.

In addition to showing how closely the theoretical and practical values check, the experiment disclosed in a convincing and practical manner the importance of giving careful attention to the location of guy anchors.

Congress Has Bill for Federal Communications Commission.

A federal communications commission, to supervise telegraph, telephone, cable and radio transmission, was proposed in a bill introduced in the Senate on December 22 by Senator Watson, chairman of the commerce committee. Mr. Watson has already introduced a bill to extend the life and powers of the radio commission.

Congress now has the choice of acting on whichever bill it prefers.

The communications commission would comprise seven members to be appointed by the president, with the advice and consent of the Senate, and each member would receive $10,000 salary.

All the functions and powers of the present radio commission would be transferred to the new body on July 1, 1929, as would those of the Interstate Commerce Commission and Postoffice Department relating to the various transmission agencies.

Telephone News Items From England

Installation of Telephone Exchanges With Intensive Subscriber Development Being Considered in Connection With Unemployment in England—Europe's Largest Private Exchange and Traffic It Handles—Figures on Telephone Use

By TELEPHONY'S Special London Correspondent

Telephone figures for July—in this country more of a holiday than a business month—showing an increase of over 700,000 in the number of inland trunk calls over those for July, 1927, provide food for thought.

Telephones and Unemployment.

Not long ago, it will be remembered, the prime minister intimated to the Telephone Development Association that he was giving consideration to the representations they had made to him that in the intensive development of the telephone system there was a promising opportunity for creating much-needed employment.

The very remarkable natural increase in the use of the telephone for trunk calls —showing quite conclusively that the telephone habit is rapidly increasing—must surely suggest to the Treasury that money spent in its exploitation will be a remunerative investment. In view of the present industrial depression, the government can ill afford to neglect any possible means of alleviation, especially when, as in this case, the public would be spending more and more money, not on a luxury but on a necessity.

The Telephone Development Association has recently issued a questionnaire to its members with a view to finding out how many extra men could be employed in the event of the government making a vigorous effort to encourage the expansion of the telephone system. Not all the members have at the moment replied, but there are quite definite indications that the number of men at present unemployed, and with no prospect of finding work, who could be absorbed in telephone development, is in the region of tens of thousands.

It seems quite probable, therefore, that the government, in its desire to alleviate distress, will not turn away from telephone development at a time when it seems obvious that the public appreciation of the telephone as a time and money-saver is growing steadily stronger.

Isle of Man Telephone Cable.

The postmaster-general has stated in the House of Commons that, provided no unforeseen difficulties arise, the telephone cable to the Isle of Man will be laid by July next. Manxland will thus be connected with the mainland for the first time by telephone during next summer, and as the island is a favorite holiday resort, the new facilities will give general satisfaction.

Fishing interests are delighted at the prospect, for gales are frequent and anxiety has more than once been felt concerning ships which have put into shelter of the island, but which, through lack of telephones, could not inform the mainland.

Europe's Largest Private Exchange.

The largest private automatic exchange in Europe, that at Waterloo station, installed some three years ago with 100 post office lines, is already insufficient to deal with increasing calls upon it, and plans are now under consideration for the expenditure of £100,000 on its extensions.

Waterloo, known to all Americans as the station for Southampton transatlantic liners, is making more and more use of the telephone. More than 3,000 calls an hour are dealt with during the peak periods. When it is remembered that almost 2,000 of the Southern Railway's stations are in direct touch with headquarters at Waterloo over the company's 850 private lines, some idea of the necessity for the proposed extension will be gathered.

Greenwich time signals are sent out from the exchange to all its 2,000 stations. From the company's four kiosks in the station some 60,000 public calls are made monthly. The railway has its own telephone directory. The present switchboard with its 40,000 separate contacts, is to be enlarged, as the policy of the railway is to replace telegraphy by telephony in the interests of efficiency.

Two More Wireless "Lines" to U. S.

The third transmitting apparatus for wireless telephone communication with America will be available for public service next summer. A fourth is being considered by the post office, which has reason to believe that the four "lines" will be kept busy by the end of next year.

Increasing Telephone Habit.

The latest available figures for telephone development show a steady growth in the British telephone habit. Inland trunk calls during July reached a total of 9,502,807, an increase of 707,645, or 8 per cent over July, 1927.

Outgoing international calls in July numbered 35,473, an increase of 10,695, or 42.7 per cent, while incoming calls totaled 38,506, an increase of 11,850, or 44.5 per cent.

The total number of telephones in use in Great Britain and northern Ireland at the end of September was 1,687,275, an increase of 9,139.

Successful Methods in Line Testing

Shunt Method of Making Tests on Line as Used in Original Stewart Test Set—Description of Later Type Set Using Detector Coil Method—Its Advantages in Locating Line Trouble Efficiently—Features of Set and Its Operation

By Chris Stewart

Up to the time the Stewart test set was placed on the market, about all the repairmen could do when trouble was reported, was to go out on the line and keep going until the trouble was located. This method, especially on long farm lines,

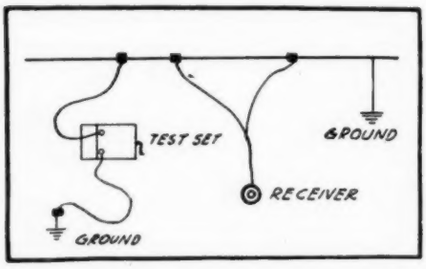


Fig. 1. Shunt Method Connections for Locating Crosses.

proved to be a costly one. To overcome this condition, the Stewart test set was built.

This test set tells which way and about how far the trouble is from the tester, without opening the line. Previous to the use of the Stewart set, when a lineman made a test to determine the direction of the trouble, it was necessary to open one or both sides of the line and test in one direction and then the other. This method always left the line with more joints in it and also wasted the time necessary to open the line.

The original Stewart test set used what is known as the shunt method, while its latest set is equipped so that it locates trouble either by the shunt or detector coil method.

A study of Fig. 1 and the following explanation will no doubt make the shunt method clear to the reader. It will be

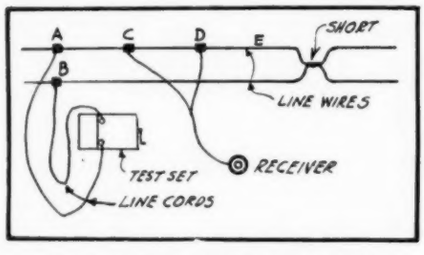


Fig. 2. Shunt Method for Locating Grounds.

noted that the current put out by the generator will pass out over the line through the fault and back over the other side of the line to the test set.

The receiver is unclipped from the test set and clipped to the wire as shown. Any time the receiver is shunted on a portion of the line between test set and the fault and the generator crank turned, a tone can be heard in the receiver. In this way the direction to the fault can be determined and still leave the line intact as it was before.

Fig. 2 shows the connection for testing with the shunt method for ground. If the detector coil is used, it is placed on the ground wire with receiver attached, otherwise the connections are the same. The lamp connected in series with the generator would indicate the approximate distance to the trouble.

The detector coil method as shown in Fig. 3 is similar, with the exception of the coil. This detector coil is a small coil with a spring clip on one side which can be put on the wire by merely pushing.

It can be put on or pulled off with one hand and does not need to be in electrical contact with the wire. Therefore, it can be used on insulated wire, rusty or corroded wire, without cutting the insulation or clearing off the rust or corrosion. It also can be used on heavy copper wire without any loss in the volume of the tone due to the low resistance of the conductor.

It has terminals to which the receiver clips can be attached. These are spring clips and can be attached instantly with the use of the fingers only.

This coil picks up the tone and in this way the direction to trouble can be determined.

The use of the coil makes it possible to locate trouble on insulated wire without cutting into the insulation, and where the wire is rusty or coated with corrosion, it is not necessary to scrape off this corrosion or rust to make contracts for the receiver. Inasmuch as the use of insulated wire is becoming more general, especially for drops, this feature is a time-saver.

This coil can also be used on inside wire or jumpers, either twisted or otherwise.

The advantages of a test set with these features are many. The lineman knows at all times which way the trouble is from him. He can go direct to the trouble without traveling over any branches of the line that are clear.

From a junction pole where the line runs two or more ways, the lineman can tell, from this pole without opening the line, which way to go for the trouble.

In clearing a case of trouble, as illustrated in Fig 4, the lineman would proceed to *A* and test. Without opening the

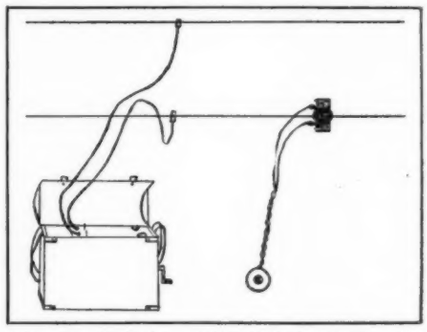


Fig. 3. Detector Coil Method of Trouble Testing.

line, he could tell that the line between *A* and *D* was clear and then could go on to *B*. At *B*, he could test again and, without opening the line, determine that the line from *B* to *F* and from *B* to *E* was clear.

Driving on to *C*, again without opening the line, he could tell the trouble was toward *J*. Traveling toward *J*, the trouble would be found at *K*.

By a study of the foregoing, it will be seen that the lineman is saved the time and travel necessary to cover the line from *A* to *D*, from *B* to *F*, and *B* to *E*, from *C* to *H* and from *C* to *I*, or the time necessary to open the line at points *A*, *B* and *C*.

Where the trouble is hard to locate, such as jumpers burned short, crossed or grounded, or inside wire burned short, this type of test saves much time as well as lost circuit time. In addition to the features just mentioned this test set is a complete portable telephone. It is of light weight and very rugged to stand rough use along the pole lines.

It is equipped with complete cords and

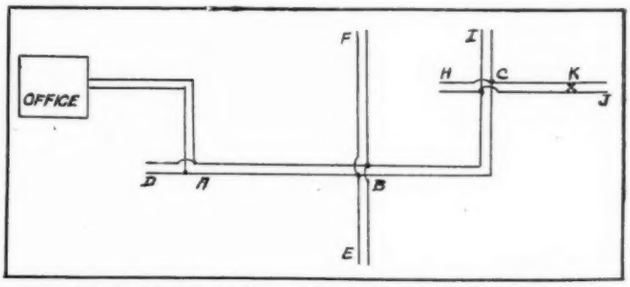


Fig. 4. Illustration of Use of Stewart Test Set in Telephone Line Trouble Location.

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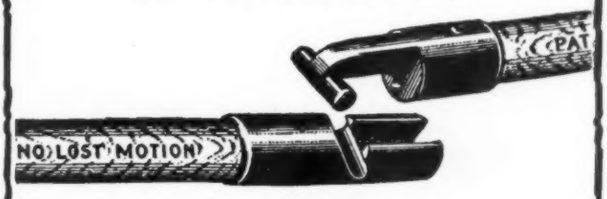

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clips and full-length shoulder strap. There is a ring and hook in the shoulder strap so that the set can be brought instantly into the best operating position, allowing the free use of both hands.

The transmitter is mounted on an inside partition and the compartment that holds

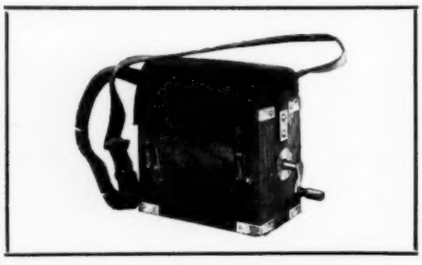


Fig. 5. The Stewart Test Set.

the receiver, cords and clips, when not in use, serves as a mouthpiece.

A leather top buckles down over the top of the set to protect it from the weather, dust, etc. The case is of oak, all joints held with screws and bound with brass, to further add to its strength. Fig. 5 shows a cut of the instrument.

A bulletin describing the test set will be furnished on request by Stewart Brothers, Ottawa, Ill.

Death of Richard M. Kerschner, Hubbard & Co. Executive.

Richard M. Kerschner, associated with Hubbard & Co. for the past 16 years, succumbed to a heart attack on December 8 at his home in Zelinople, Pa. His death followed a period of several months of poor health from which he was apparently recovered to a considerable extent, only to lose out after a sudden illness of a short duration.

Richard M. Kerschner, Who Passed Away After Brief Illness, Was Head of Department of Development and Research of Hubbard & Co., Pittsburgh.

Upon leaving school Mr. Kerschner obtained a position with the old Chicago Edison Co. with which he remained until 1900 when he joined the sales force of the Union Electric Co. of Pittsburgh. In 1914 he joined the sales department of Hubbard & Co., later becoming sales manager.

In 1924 he supervised the building of the new Hubbard factory at Oakland, Calif., remaining in charge there until 1927 when he returned to Pittsburgh to assume charge of the department of development and research, in which position he was active up to the time of his death. He had built up a host of friends throughout the central station men of the country.

Death of Vice-President Clifford of Bell Telephone Laboratories.

Edward Preston Clifford, vice-president of the Bell Telephone Laboratories, died December 16 at his home in New York City of bronchial pneumonia.

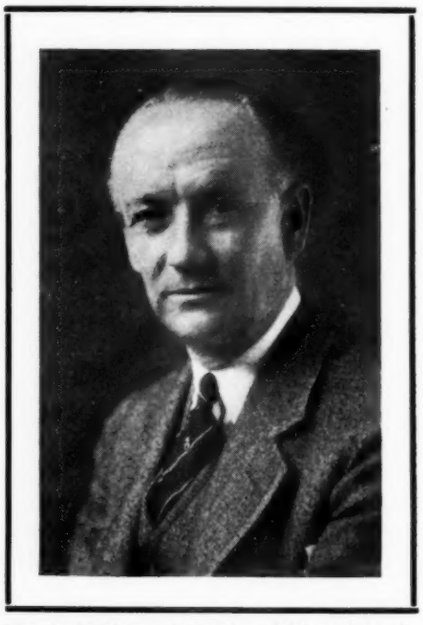
Mr. Clifford was born June 21, 1875, in New York City and was educated in its public and high schools. He entered the employ of the Western Electric Co. in 1892 as an office boy, and became cashier of the New York office some six years later.

After experiences as chief clerk at Chicago, Philadelphia and New York, he became assistant manager of the New York house, and in 1911 its manager, with supervision of the Boston, Philadelphia and Pittsburgh houses. In 1917 he was appointed eastern district manager of the Western Electric Co.

During the war, the engineering department of the Western Electric Co. was called on to investigate many problems such as aircraft and submarine detection, sound ranging of enemy guns and radio. It also produced apparatus on a considerable scale. To handle the multitude of commercial matters incident to this sudden growth of activity, a man of broad business training was required. On July 1, 1918, Mr. Clifford was brought in, at first with the title of office manager. A year later he became commercial manager and his responsibilities were gradually extended to embrace all non-technical activities.

In 1925 the engineering department of the Western Electric Co. became the Bell Telephone Laboratories, Inc., and Mr. Clifford, as vice-president, was placed in charge of the general staff. Among his responsibilities were personnel and employe relations, a field in which he had long been interested and notably successful. Relations with the American Telephone & Telegraph Co. and Western Electric Co. were of great moment as these companies were at once owners and customers of the laboratories. Financial administration of a budget of more than $15,000,000 implies extensive accounting.

An engineering shop employing 275 skilled mechanics was another responsibility, as well as the maintenance of buildings aggregating 530,000 square feet of floor space. Other services to the technical staff were rendered by the engineering library, by the photographic and blueprint groups, and the central filing and typing bureau. Publication of the laboratories' work in its own magazine and elsewhere was also one of Mr. Clifford's interests.



The Late Edward Preston Clifford Was in Employ of Western Electric Co. and Bell Telephone Laboratories for 36 Years, Commencing in 1892 as Office Boy.

To carry on these many-sided activities, Mr. Clifford gathered about him a staff of men who possessed, in addition to professional skill in their own line, an interest in and a knowledge of the technical side of the Laboratories work. Thus they have been able to understand the language and the viewpoint of the scientist and the engineer, and to apply their own craftsmanship most effectively in relieving their associates of a vast burden of details. This organization and the viewpoint it represents of forward-looking service to others, are Mr. Clifford's final contribution to the industry in which he found his life-work.

Prices in the Metal Markets.

New York, December 24—Copper—Firm; electrolytic, spot and future, 16@16¼c. Iron—Steady; No. 2 f. o. b. eastern Pennsylvania, $20.50@21.00; Buffalo, $17.50@18.50; Alabama, $16.50@17.00. Lead—Steady; spot New York, 6.50c; East St. Louis, 6.35c. Tin—Steady; spot, 49.75c. Zinc—Steady; East St. Louis spot and future, 6.35c. Antimony, 9.75c. Quicksilver, $123.00.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Radio Monopoly Charge Dismissed by Federal Trade Commission.

The Federal Trade Commission announced on December 19 that it had dismissed its complaint against the General Electric Co., Radio Corp. of America, and others, charging unfair competition in radio communications and manufacture of radio apparatus. The case had been before the commission since January, 1924.

The others listed in the complaint were: American Telephone & Telegraph Co., Western Electric Co., Inc., Westinghouse Electric & Mfg. Co., International Radio Telegraph Co., United Fruit Co., and the Wireless Specialty Apparatus Co.

More than 10,000 pages of testimony were taken in the case by attorneys for the commission. Hearings were held in New York, Washington, New Orleans, Seattle, San Francisco, Chicago and Boston, beginning in October, 1926, and ending in New York in February, 1928.

E. A. McCulloch was the only member of the commission voting against dismissal of the complaint. Chairman Abram Myers noted for the record that he concurred in the action of the majority for the reason that the commission was without jurisdiction to enter an effective order. The entire commission participated in the decision.

Another complaint filed by the commission for alleged violation of the Clayton antitrust law is still pending against the Radio Corp. of America. Other respondents in the dismissed action are not included in the second complaint, it was explained orally by the commission.

Extension of Chicago Franchise of Illinois Bell Company.

Presaging difficulty in agreeing on a new franchise for the Illinois Bell Telephone Co. in Chicago the city council subcommittee has voted to seek authority from the city council to negotiate with the company for a 90-day extension of the old franchise which expires January 8.

Senator Roy A. Woods, counsel for the city, pointed out that it would probably take several months to work out the new franchise. He also declared that the city might well seek amendatory legislation regarding the state public utilities law so that "home rule" of the utilities might be returned to the city.

Following this action the company notified the committee that it has "serious objections" to an extension. The company's letter, indicating that it will accept an extension only at its own terms, was interpreted by some as a threat to ignore the city altogether and go to the Illinois Commerce Commission for a franchise. It also brought to a new focus the question of how far the city's powers have been stripped away by the state public utilities act of 1913.

The kernel of the company's communication, signed by W. R. Abbott, president, was this sentence:

"There would be serious objections on our part to accepting a temporary extension of the present ordinance, since many of its provisions have been rendered obsolete by the adoption of state-wide regulation of public utilities."

Mr. Abbott reminded the committee that

THEODORE GARY AND COMPANY
KANSAS CITY, MISSOURI

Eighty-second Consecutive Quarterly Dividend

The regular quarterly dividend of $2.00 a share on the Preferred stock and the usual dividend on the Common stock has been declared payable January 2, 1929, to the Stockholders of record as of the 31st day of December, 1928, at 3:00 p. m. The books will be closed to transfer on December 20th and reopened on January 2, 1929.

(Signed) C. A. Bennett,
Vice-President and Treasurer.

December 19, 1928.

WORTH ITS WEIGHT IN GOLD
says a user of the
"STEWART" Test Set
Why did he say that? There's a reason.

The most economical Test Set on the market. This Test Set saves many thousands of dollars each year for operating companies.

Now equipped with the new Detector Coil.

Tells which way and how far trouble is from the tester without opening the line.

Write for bulletin or order one on trial.

STEWART BROTHERS
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Also—Cable Testers—Detecto-Meters and Test Cabinets. Our repair job will make your old Test Set operate as good as a new one.

Diversified Investments Incorporated
Kansas City, Missouri

The regular quarterly dividend of $1.75 per share on the 7% First Preferred Stock; and $1.00 per share (at the rate of 8% on the issue price) on the Class A Stock; and $1.00 per share (at the rate of 8% on the issue price) on the Class C Stock, will be paid on January 15, 1929, to the stockholders of record on January 2, 1929, at 3:00 o'clock P. M.

V. E. CHANEY,
Vice President and Treasurer.

We would be pleased to quote you on

Poles, Poleline Hardware, Cross Arms, Iron and Copper Wire and Cables, Batteries, Insulators, Etc.

Telephone Construction & Distributing Co.
Petersburg, Indiana

the company demands certain concessions in the new franchise draft it has submitted, including payment to the city of a fee of 3 per cent of operating revenues instead of gross revenues, elimination of $130,000 worth of free service to the city annually, and abolition of its maintenance of the city department of public service. The company is unwilling to forego these concessions even while negotiations are in progress, Mr. Abbott said.

He suggested that these matters be held in abeyance until the negotiations are finished. During this time, under his plan, the company would operate without a franchise, an unprecedented procedure.

Injunction Suit Against Indiana Commission Order Dismissed.

An injunction suit of the Citizens Telephone Co., Brazil, Ind., to prevent the Indiana Public Service Commission from establishing a schedule of rates for the company was ordered dismissed in federal court in Indianapolis December 18 on motion of the plaintiff.

After a preliminary hearing on the case some weeks ago, the case was remanded to the commission, when it was shown that an erroneous basis for establishing rates had been used. Since then the commission has ordered an increase in rates on the basis which the company stipulated.

Appeals from Indiana Commission Order Authorizing Competition.

A fight over telephone service in Ripley county, Ind., has been carried to the federal court. A suit has been filed by the Batesville Telephone Co. against the Indiana Public Service Commission and officials of the Farmers' Mutual Telephone Co., of Ripley county, asking an injunction against the enforcement of an order of the commission of November 23, which permitted the defendant telephone company to compete with the Batesville firm in providing telephone service in Versailles.

The Batesville company asserted in its petition that there is no necessity for competition in that city.

Commission Refuses to Abolish "Free" Exchange Service.

Women in Dubois county, Indiana, will retain their prerogative of "purposeless visiting" over the telephone in distant parts of the county without paying extra for their little social chats as a result of an order issued December 18 by the Indiana Public Service Commission.

The commission refused to authorize toll rates between the Holland Telephone Co. and exchanges at Jasper, Ireland, Haysville, Schnellville, St. Anthony, Birdseye and Ferdinand, operated by the Southern Indiana Telephone & Telegraph Co.

Owners of the Southern Indiana company were irked by the alleged lengthy conversations of the "visitors" and claimed business calls were delayed by the fair conversationalists. Persons with business calls would prefer to pay a small toll charge rather than endure endless waiting, said the company. In denying the petition, the commission ruled that the company knew all about the tete-a-tetes and the free interchange of calls through the various towns when it recently purchased the eight exchanges.

The condition is unchanged since the purchase and, consequently, the "purposeless visiting" can continue on a free basis. The order was written by Commissioner Howell Ellis. John McCardle, a member of the commission, dissented.

Asks Connecting Lines to Move Because of Induction.

Static in telephones along a high voltage electric line forms the basis of a petition filed with the Kansas Public Service Commission recently.

Charles E. Reece, owner of the Riley Telephone Co., filed a petition asking that the Farmers Mutual and Midland Telephone companies of Leonardville move their half of a connecting line over to a road a mile away from the high tension line. Mr. Reese says he moved his half some time ago and wants an order forcing the two Leonardville companies to follow suit, thus avoiding the noises induced in telephone sets from the electric lines.

Kansas Farmer Line Objects to Telephone Pole Rental.

Down in south Shawnee and north Osage counties, in Kansas, a group of farmers own their own telephone line, connected with the Wakarusa exchange. F. W. Chamberlain, president of "Line No. 2200," has filed a petition with the Kansas Public Service Commission complaining that the American Telephone Co., owner of the Wakarusa exchange, not only imposes a switching charge, but also a pole rental from where the private line connects with the main line into the exchange.

The petition ask for an order forbidding the company to assess the pole rental against the farmers who have installed their own line and equipment.

City Attorney of Louisville, Ky., Believes Increase Justified.

City Attorney W. T. Baskett, of Louisville, Ky., believes the Southern Bell Telephone & Telegraph Co. is entitled to the rate increases applied for in a proposed ordinance now in the hands of a revision committee, a recent letter from him to the general council and to Mayor William B. Harrison, stated.

His letter says:

"I have made a careful study of the report of the Public Utilities Bureau and feel that a conscientious effort has been made by the bureau to determine the value of the Louisville properties of the Southern Bell Telephone & Telegraph Co., together with its present and future operating expenses and revenues. I have attended conferences between the mayor and the company officials where important facts pertinent to the question of increased rates have been fully developed.

The courts have uniformly held that a public utility is entitled to earn a fair rereturn on its property used or useful in public service. Applying the settled law to the fact developed by the Public Utilities Bureau and the mayor, I see no escape from the conclusion that the Southern Bell Telephone & Telegraph Co. is entitled to the increased rates applied for."

Michigan Commission Gives Approval of Consolation.

Articles of association of the Consolidated Telephone Co. of Springport, Mich., and rates for service have been approved by the Michigan Public Utilities Commission. The new company plans to issue capital stock in the amount of $25,000.

The telephone consolidation includes the Springport Mutual Telephone Co., the Partello Telephone Co., Springport & Otto Creek Telephone Co., Springbrook Telephone Co., Springport Telephone Exchange Co., and part of the North Parma Telephone Co.

Rate Application Shows Property Depreciation at Bloomfield, Neb.

The Bloomfield Telephone Co., of which J. T. Coffey is president and principal owner, has applied to the Nebraska State Railway Commission for authority to increase business rates from $1.75 to $2.50 a month, and residence and farm rates from $1.25 to $1.50 a month, with permission to add 25 cents a month in each case where a desk instrument is desired. Residence extensions will remain at 50 cents, business extensions at $1 and switching at $5 a year.

Bloomfield attained considerable nationwide notoriety some eight years ago by reason of the strike engineered by a few hot-heads among the subscribers, who ordered out their telephones, more than 600 in number, when the state commission authorized exactly the same rates that are now being asked for. Today, however, Mr. Coffey has 85 per cent of these subcribers petitioning with him for the very same rates that caused a strike and much loss of money to the then owner.

It was in February, 1921, after the company had rebuilt the Bloomfield exchange, that the owner, the Union Telephone Co. of Wausa, of which J. E. Baggstrom has long been head, asked the commission for a 25-cent increase in rates. The commission found it reasonable, but trouble was fomented among subscribers with the result that for the next ten months only a

few persons paid for service over the exchange, while the town people reverted to ancient methods of communication.

Later the company secured the consent of the commission to a modification of the proposed schedule so that it was only about half as much of an increase as had been originally allowed and which the commission found was proper. The subscribers, however, stood firm, having made a success of their strike, and on January 10, 1922, the company was given permission to close the exchange.

Within the next ten days, J. H. Gesler, who had been the local manager at Bloomfield, and a partner bought the exchange on long time and reopened it at the old rates. These have been in force ever since. At no time has the exchange, even though the strictest economy was employed, been able to earn a return on the $75,000 invested in it, and in fact it has steadily decreased in value because the rates did not permit the keeping up of the property. Mr. Gesler has been carrying the burden himself for several years, but some months ago sold out to Mr. Coffey, who came from Iowa.

Mr. Coffey spent considerable money putting the plant into better service condition, but immediately started out to sell the idea of higher rates to the more than 700 patrons served, nearly 400 of whom are farmers. He got out circulars in which he set out that he would not be able to better the service unless he had larger revenues.

He pointed out that the existing rates are the lowest in that section of the state, in spite of the fact that it is the third largest exchange there, being exceeded in number of subscribers only by Norfolk and Wayne. He also quoted the statistics to show that the average business rate in Nebraska is $3.58 a month, the average residence, $2.23, and the average farm rate, $1.91.

Both individual cards and a petition were circulated. These, with their signatures, were sent the commission. These expressed a willingness to pay the 25-cent a month increase. The commission is investigating the records of the company for the last six years, and will probably act in the matter speedily so that the new rates may go into effect with the new year.

The balance sheet of the company shows that it has total assets, book value of $77,448; preferred stock of $35,000; bonds of $20,000, with a depreciation reserve of $28,995, but with the surplus in the red $8,783. The revenues for the 12 months ending November 1 were $14,821, and actual operating expenses, without depreciation, $10,984.

Mr. Coffey is represented in the matter by George W. Kloidy, secretary of the Nebraska Telephone Association. He estimates that the new rates, with the number of stations remaining as now, will produce total revenues of $16,508, with expenses at $11,704. With 4 per cent depreciation computed, this will leave 5 per cent return on the $55,000 that Mr. Coffey fixes as the present actual value of the property, which means that $20,000 of value has disappeared under the unremunerative rates of the past eight years.

Ohio Central Company Collects Increased Rates Under Bond.

The proposed increase in telephone rates in Alexandria and Utica, villages in Licking, county, Ohio, will be put into effect at once, under the Pence law provisions of making the collections of the increased rates under bond, the Ohio Public Utilities Commission announced on December 21.

The Ohio Central Telephone Co., which operates the two exchanges, elected to take advantage of the provision of the law and posted a bond of $2,700 to cover any rebates which may be ordered by the Ohio Public Utilities Commission after a hearing on the rates is held. The commission is making a valuation of the telephone property with a view of ascertaining if the higher schedule of rates is reasonable.

It is estimated by the company that the higher schedule will mean an increase in the receipts of the Utica exchange of $3,741 and at Alexandria of $1,662. In case the commission orders lower rates the difference will be refunded out of the amount of the bond.

Changes Recommended in Nebraska Compensation Law.

The commission named by Governor McMullen on authority of the Nebraska legislature to recommend changes in the workmen's compensation law has filed a voluminous report. The public, the employer and the workers had representation on the commission, and the report was unanimous.

Only those changes were recommended upon which agreement was possible, since any report other than one that was unanimous was regarded as impossible of challenging legislative attention. This made necessary the abandonment of the workers' movement for a state fund with all private compensation insurance companies barred.

The report does not attempt to deal with the question of fixing a schedule of fees for doctors, surgeons and hospitals, for the payment of which more than half the compensation money now goes. The commission recommends that the state compensation commissioner be authorized to fix such a schedule, with authority to make it flexible enough to meet various emergency cases. It also wants the law changed so that appeals from the commissioner's decision may be taken direct to the supreme court.

Another recommendation is that the

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WHEN you purchase Storm Kings you obtain "A longer life cell." Thus—a saving on every battery. And Storm King is a cell made exactly to telephone requirements.

STORM KING batteries have developed a new insulating material, more highly absorbent than any other, which will retain the chemical solution much longer than anything so far developed. The result is the longest service life ever developed in a telephone battery and this in turn means substantial savings to telephone companies in cutting down renewal costs to a new low point.

Manufactured by
GENERAL DRY BATTERIES, INC.
Cleveland, Ohio

Distributors:
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W. S. Nott Company, Minneapolis, Minn.
Suttle Equipment Co., Lawrenceville, Ill.

consent of the commissioner be necessary in all case of lump-sum settlement, the present law permitting the district judges to approve these without such consent. In any event, the commission recommends that the law fix as the basis of all such settlements the present value of the weekly payments, computed on a 5 per cent basis.

The commission finds that rates in Nebraska are much higher than in most other states, but refused to recommend lower weekly payments to injured persons. It is of the opinion that the appointment of more factory inspectors and the launching of an educational drive in the interest of workers' safety would be effective in reducing accidents, which is the best way to get reduced rates. The employment of more deputies so as to secure prompt hearings, with the commissioner acting in the capacity of appellate court, together with many minor changes in the procedure are recommended.

Portland, Ore., Seeks to Force Bell to Accept Franchise.

The city council of Portland, Ore., has authorized the city attorney to proceed through the courts immediately to force the Pacific Telephone & Telegraph Co. to accept a franchise recently voted by the people. The action was taken following the formal refusal of the telephone company to accept the franchise.

The people of Portland voted by an overwhelming majority in November to give the telephone company a five-year franchise in which present rates were reduced and the council given rate-fixing powers.

The company rejected the franchise on the grounds that only the Oregon Public Service Commission has the rate fixing power in the state. The city council will now seek to enforce the franchise through appeal to the courts.

Pacific Company Submits New Franchise to Settle Dispute.

The Pacific Telephone & Telegraph Co., seeking to end its controversy with the city of Baker, Ore., has offered to the city commissioners a new franchise which provides for payment of $65,000 over a period of 25 years. If approved by the commissioners, the proposal would be referred to the people for ratification.

In addition to the payment of $65,000 in 25 years, the telephone company agrees to pay the costs of a special election and whatever legal expense and court costs have been incurred by the city in the pending action, and also will remit taxes of the basis of the old agreement from February 8, 1928, when the old franchise expires, until June 30, 1929, or until a new franchise is initiated.

The city received nothing for the first five years under the old agreement, which ran for 30 years, 5 per cent of the gross earnings for the next five years and 8 per cent of the gross earnings for the remainder of the life of the franchise. The company's gross receipts last year amounted to approximately $55,000 netting $4,400 to the city, City Clerk Alfrey said.

When the old franchise expired, the company submitted a proposed agreement to the city calling for the payment of 2 per cent of its gross earnings. The proposal was rejected by the city commissioners who offered a franchise providing payment of 8 per cent of the company's gross receipts. The company refused to accept this. The commissioners then passed an ordinance requiring the company to pay 20 cents a month rental on each pole within the city limits. This would amount to $370 a month. Several statements were mailed by the city which then filed suit to collect the account.

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION.

December 27: Hearing in Washington on application of Emporia Telephone Co., Emporia, Kans., to acquire control of Sabetha Telephone Co., Sabetha, Kans., by purchase of all of its common stock for $64,000. The companies are non-competing. The Sabetha company has been managed and operated for many years indirectly under the supervision of the officers of the Emporia company. W. W. Finney is president of both companies.

December 27: Hearing in Washington on application of Emporia Telephone Co., Emporia, Kans., to acquire control of the Paola Telephone Co., Paola, Kans., by purchase of all of its common stock for $27,520. The companies are now competing, and the Paola company has been managed and operated for many years indirectly under supervision of the officers of the Emporia company. W. W. Finney is president of both companies.

December 27: Hearing in Washington on application of Mountain States Telephone & Telegraph Co. for authority to acquire the properties of the Montezuma County Telephone Co., Colorado, for $69,500. The system of the Montezuma County company consists principally of an exchange at Dolores, an exchange at Cortez, and toll line from Dolores to Cortez, from Cortez to Mancos, and from Dolores to Mancos, all in Montezuma county, Colorado.

On September 15, the Montezuma County Telephone Co. had a development of approximately 337 owned stations and approximately 59 miles of toll pole line carrying about 70 miles of metallic iron wire and about 14 miles of copper wire.

ILLINOIS.

December 18: Order approved annulling order suspending the rate schedule of the Middle States Telephone Co. applying to service in Pekin, Havana, Lacon, Green Valley and Manito and authorizing the company to put its new schedule into effect there January 1, after modification of the rate for hand-set telephones to read, "added to listed rate, 25 cents a month."

December 18: Order entered authorizing the Inter-County Telephone Co. to put into effect new rates in Mt. Olive and vicinity, effective as of December 1.

December 1: Order approved suspending until April 29, 1929, proposed advances in rates of the Lincoln Telephone Co. in Lincoln, Elkhart and New Holland.

INDIANA.

December 7: The Clayton Telephone Co. granted permission to purchase the Stilesville Telephone Co. for $160.

December 7: Commission dismissed the petition of the Terhune Cooperative Telephone Co. for authority to rent telephones and equipment from its subscribers.

December 7: An increase in rates granted the Public Service Telephone Co., of Leesburg, for its Cromwell and North Webster exchanges. No protest against the increase was made by patrons.

December 7: Order issued authorizing the Northern Indiana Telephone Co., of North Manchester, to discontinue its exchange at Luther. Fifty-one patrons of the company petitioned for the discontinuance and wished to be transferred to another exchange, the Bippus exchange.

December 18: Order issued denying application of Southern Indiana Telephone & Telegraph Co. to establishe toll rates between the Holland Telephone Co. and the exchanges at Jasper, Ireland, Haysville, Schnellville, St. Anthony, Birdseye and Ferdinand, which the Southern Indiana company recently purchased.

December 19: Petition filed by N. N. Bott, of Jasper county, seeking authority to purchase the Lochiel Telephone Co. located in Benton county, from Edward and Clara Lewis.

KANSAS.

December 6: Petition filed by F. W. Chamberlain, president of "Line No. 2,200," connected with the Wakarusa exchange of American Telephone Co. asking for an order forbidding company to assess the pole rental against farmers who have installed their own line and equipment.

December 6: William C. Zimmerman of Red Rock, Okla., has purchased the Smith Telephone Co. of Syracuse, Manter and Johnson, Kan., and asks for permission to take over the property. C. H. Smith is owner of the exchanges in the three towns.

December 6: Petition filed by Charles E. Reece, owner of Riley Telephone Co., asking that the Farmers Mutual and Midland Telephone companies move their half of a connecting line to a road a mile away from a high tension line because of induction. He already has moved his part of the line.

January 10: Hearing at Lone Elm on application of the Kansas Telephone Co. for permission to consolidate its telephone plant at Lone Elm with its plant at Kincaid, and abandon the Lone Elm switchboard.

January 11: Hearing at Topeka in the matter of the complaint of F. W. Chamberlain, complainant, vs. the American Telephone Co. at Wakarusa.

January 11: Hearing at Longton on application of the Longton Telephone Co. for a change in its rates for telephone service at Longton.

MICHIGAN.

December 10: Approval given consolidation of several companies into the Consolidated Telephone Co., of Springport, and rate schedule authorized.

MINNESOTA.

December 18: Scott County Telephone Co. of Jordan authorized to establish and place in effect at its Jordan exchange, as of January 1, the schedule of service connection charges, charges for outside and inside moves, changes in type of equipment and other miscellaneous charges, as contained in its application.